# Snider DEC Exhibit 1

2020 DEC IRP and attachments, as filed with the Commission on September 1, 2020, with minor corrections filed November 6, 2020.

# Snider DEP Exhibit 1

2020 DEP IRP and attachments, as filed with the Commission on September 1, 2020, with minor corrections filed November 6, 2020.

# 1 EXECUTIVE SUMMARY

As one of the largest investor-owned utilities in the country, Duke Energy has a strong history of delivering affordable, reliable and increasingly cleaner energy to our customers. In planning for the future, the Company is transforming the way it does business by investing in increasingly cleaner resources, modernizing the grid and transforming the customer experience. Duke Energy Carolinas (DEC), a public utility subsidiary of Duke Energy, owns nuclear, coal, natural gas, renewables and hydroelectric generation. That diverse fuel mix provides about 23,200 megawatts (MW) of owned electricity capacity to 2.7 million customers in a 24,000 square-mile service area of North Carolina and South Carolina.

As required by North Carolina Utilities Commission (NCUC) Rule R8-60 and subsequent orders, the Public Service Commission of South Carolina (PSCSC) and The Energy Freedom Act (Act 62) in South Carolina, Duke Energy Carolinas is submitting its 2020 Integrated Resource Plan (IRP). The IRP balances resource adequacy and capacity to serve anticipated peak electrical load, consumer affordability and least cost, as well as compliance with applicable state and federal environmental regulations. The IRP details potential resource portfolios to match forecasted electricity requirements, including an appropriate reserve margin, to maintain system reliability for customers over the next 15 years. In addition to meeting regulatory and statutory obligations, the IRP is intended to provide insight into the Company's planning processes.

DEC operates as a single utility system across both states and is filing a single system IRP in both North Carolina and South Carolina. As such, the quantitative analysis contained in both the North Carolina and South Carolina filings is identical, although certain sections dealing with state-specific issues such as state renewable standards or environmental standards may be unique to individual state requirements. The IRP to be filed in each state is identical in form and content. It is important to note that DEC cannot fulfill two different IRPs for one system. Accordingly, it is in customers' and the Company's interest that the resulting IRPs accepted or approved in each state are consistent with one another.

In alignment with the Company's climate strategy, input from a diverse range of stakeholders, and other policy initiatives, the 2020 IRP projects potential pathways for how the Company's resource portfolio may evolve over the 15-year period (2021 through 2035) based on current data and assumptions across a variety of scenarios. As a regulated utility, the Company is obligated to develop an IRP based on the policies in effect at that time. As such, the IRP includes a base plan without carbon policy that represents existing policies under least-cost planning principles. To show the impact potential new policies may have on future resource additions and in response to stakeholder feedback, the 2020 IRP also introduces a variety of portfolios that evaluate more aggressive carbon emission reduction targets. As described throughout the IRP, these portfolios have trade-offs between the pace of carbon reductions weighted against the associated cost and operational considerations. These portfolios will ultimately be shaped by the pace of carbon reduction targeted by future policies and the rate of maturation of new, clean technologies.

Inputs to the IRP modeling process, such as load forecasts, fuel and technology price curves and other factors are derived from multiple sources including third party providers such as Guidehouse, IHS, Burns and McDonnell, and other independent sources such as the Energy Information Administration (EIA) and National Renewable Energy Laboratory (NREL). These inputs reflect a "snapshot in time," and modeling results and resource portfolios will evolve over time as technology costs and load forecasts change. The plan includes different resource portfolios with different assumptions around coal retirement and carbon policy but recognizes that the modeling process is limited in its ability to consider all potential policy changes and lacks perfect foresight of other variables such as technology advancements and economic factors. To the extent these factors change over time, future resource plans will reflect those changes.

To further inform the Company's planning efforts, in 2019, Duke Energy contracted with NREL[1] to conduct a Carbon-Free Resource Integration Study[2] to evaluate the planning and operational

[1] "An industry-respected, leading research institution that advances the science and engineering of energy efficiency, sustainable transportation and renewable power technologies", www.nrel.gov.

[2] https://www.nrel.gov/grid/carbon-free-integration-study.html.

considerations of integrating increasing levels of carbon-free resources onto the Duke Energy Carolinas and Duke Energy Progress systems. Phase 1 of the study[3] has helped inform some of the renewable resource assumptions and reinforced the benefits that a diverse portfolio can provide when integrating carbon-free generation on the system. Phase 2 of the NREL study is underway now. This study is being informed by stakeholder input and will provide a more granular analysis to understand the integration, reliability and operational challenges and opportunities for integrating carbon-free resources and will inform future IRPs and planning efforts.

In accordance with North Carolina and South Carolina regulatory requirements, the 2020 IRP includes a most economic or "least-cost" portfolio, as well as multiple scenarios reflecting a range of potential future resource portfolios. These portfolios compare the carbon reduction trajectory, cost, operability and execution implications of each portfolio to support the regulatory process and inform public policy dialogue. In North Carolina, Duke Energy is an active participant in the state's Clean Energy Plan stakeholder process, which is evaluating policy pathways to achieve a 70% reduction in greenhouse gas emissions from 2005 levels by 2030 and carbon neutrality for the electric power sector by 2050. Accordingly, this year's IRP includes two resource portfolios that illustrate potential pathways to achieve 70% $CO_2$ reduction by 2030, though both scenarios would require supportive state policies in North Carolina and South Carolina. All portfolios keep Duke Energy on a trajectory to meet its near-term enterprise carbon-reduction goal of at least 50% by 2030 and long-term goal of net-zero by 2050. These portfolios would also enable the Company to retire all units that rely exclusively on coal by 2030. Looking beyond the planning horizon, the 2020 IRP includes a section that provides a qualitative overview of how technologies, analytical tools and processes, and the grid will need to evolve to achieve the Company's net-zero 2050 $CO_2$ goal. Duke Energy welcomes the opportunity to work constructively with policymakers and stakeholders to address technical and practical issues associated with these scenarios.

Act 62, which was signed into law in South Carolina on May 16, 2019, sets out minimum requirements for each utility's IRP. The 2020 IRP contains the necessary information required by Act 62, including, the utility's long-term forecast of sales and peak demand under various scenarios, projected energy purchased or produced by the utility from renewable energy resources, and a summary of the electrical transmission investments planned by the utility.

[3] https://www.nrel.gov/grid/carbon-free-integration-study.html.



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The IRP also includes resource portfolios developed with the purpose of fairly evaluating the range of demand side, supply side, storage, and other technologies and services available to meet the utility's service obligations. Consistent with Act 62 and NC requirements, the IRP balances the following factors: resource adequacy and capacity to serve anticipated peak electrical load with applicable planning reserve margins; consumer affordability and least cost; compliance with applicable state and federal environmental regulations; power supply reliability; commodity price risks; and diversity of generation supply.

## EXECUTIVE SUMMARY

Duke Energy's history of delivering reliable, affordable and increasingly cleaner energy to its customers in the Carolinas stems back to the early 1900's, when visionaries harnessed the natural resource of the Catawba River to develop an integrated system of hydropower plants that provided the electricity to attract new industries to the region. As the population in the Carolinas has grown and energy demand increased, the Company has worked collaboratively with customers and other stakeholders to invest in a diverse portfolio of generation resources, enabled by an increasingly resilient grid, to respond to the region's growing energy needs and economic growth.

Today, Duke Energy Carolinas (DEC) serves approximately 2.7 million customers. Over the 15-year planning horizon, the Company projects the addition of 560,000 new customers in DEC contributing to 1,650 MW of additional winter peak demand on the system. Even with the expansion of energy efficiency and demand reduction programs contributing to declining per capita energy usage, cumulative annual energy consumption is expected to grow by approximately 7,200 GWh between 2021 and 2035 due to the projected population and household growth that exceeds the national average. This represents an annual winter peak demand growth rate of 0.6% and an annual energy growth rate of 0.5%. In addition to growing demand, DEC is planning for the potential retirement of some of its older, less efficient generation resources, creating an additional need of at least 3,925 MW over the 15-year planning horizon. After accounting for the required reserve margin, approximately 4,600 MW of new resources are projected to be needed over the 15-year planning horizon.

While growing, DEC is projecting slightly lower load growth compared to the 2019 IRP due to a somewhat weaker economic outlook, the addition of 2019 peak history showing declines in commercial and Industrial energy sales, and other refinements to the forecasting inputs. Additionally,



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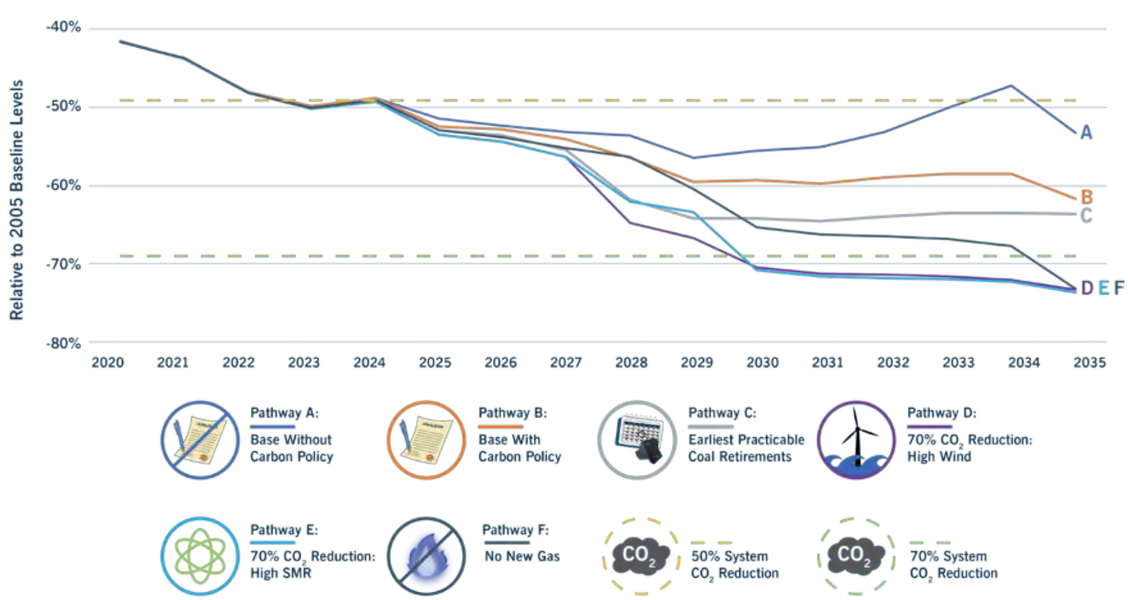
due to the timing of the spring 2020 load forecast, which was developed using Moody's economic inputs as of January 2020, and the lack of relevant historical data upon which to base forecast adjustments, the potential impacts of COVID-19 are not incorporated in this forecast. Based on summer 2020 demand observations to date, however, it appears that the COVID-19 impact to peak demand is relatively insignificant. The Company will continue to monitor the impacts from the pandemic, including the higher residential demand and changing usage patterns, as well as the projected macroeconomic implications and incorporate changes to the long-term planning assumptions in future IRPs.

## REDUCING GHG EMISSIONS

In 2019, Duke Energy announced a corporate commitment to reduce $CO_2$ emissions by at least 50% from 2005 levels by 2030, and to achieve net-zero by 2050. This is a shared goal important to the Company's customers and communities, many of whom have also developed their own clean energy initiatives. As one of the largest investor-owned utilities in the U.S., the goal to attain a net-zero carbon future represents one of the most significant reductions in $CO_2$ emissions in the U.S. power sector. The development of the Company's IRP and climate goals are complementary efforts, with the IRP serving as a road map that provides the analysis and stakeholder input that will be required to achieve carbon reductions over time. All pathways included in the 2020 IRP keep Duke Energy on a trajectory to meet its carbon goals over the 15-year planning horizon.

### COMBINED CARBON REDUCTION BY SCENARIO



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DEC has a strong historic commitment to carbon-free resources such as nuclear, hydro-electric and solar resources. In addition, as described in Appendix D, DEC provides customers with an expansive portfolio of energy efficiency and demand-side management program offerings. In total, DEC and Duke Energy Progress (DEP), through their Joint Dispatch Agreement (JDA), serve more than half of the energy needs of their customers with carbon free resources, making the region a national leader in carbon-free generation.

Combined, DEC and DEP operate six nuclear plants and 26 hydro-electric facilities in the Carolinas with winter capacities of over 11,000 MW and 3,400 MW respectively. In 2018, Duke Energy's nuclear fleet provided half of our customers' electricity in the Carolinas, avoiding the release of about 54 million tons of carbon dioxide, or equivalent to keeping more than 10 million passenger cars off the road. As the Company meets its customers' future energy needs and reduces its carbon footprint, it is seeking to renew the licenses of 11 nuclear units it operates at six plant sites in the Carolinas. This provides the option to operate these plants for an additional 20 years. In addition, DEC and DEP purchase or own approximately 4,000 MW of solar generation coming from approximately 1,000 solar facilities throughout the Carolinas. In DEC, where a large portion of energy has historically been sourced from carbon-free resources, the Company has reduced $CO_2$ emissions by 36% since 2005. In addition to a leadership position in absolute emission reductions, energy produced from the combined DEC/DEP fleet has one of the lowest carbon-intensities in the country. With a current $CO_2$ emissions rate of just over 600 pounds /megawatt-hour, the combined Carolinas' fleet ranks among the nation's top utilities for the provision of low carbon-intensive energy.[4] The following figure illustrates how the Company is building on its leadership position through the addition of carbon free resources such as solar and wind while also reducing the emissions profile and carbon intensity of remaining fossil generation by reducing dependence on coal and increasing utilization of more efficient, less carbon intense, natural gas resources.

[4] Source: MJ Bradley, "Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States" – July 2020, p. 30.



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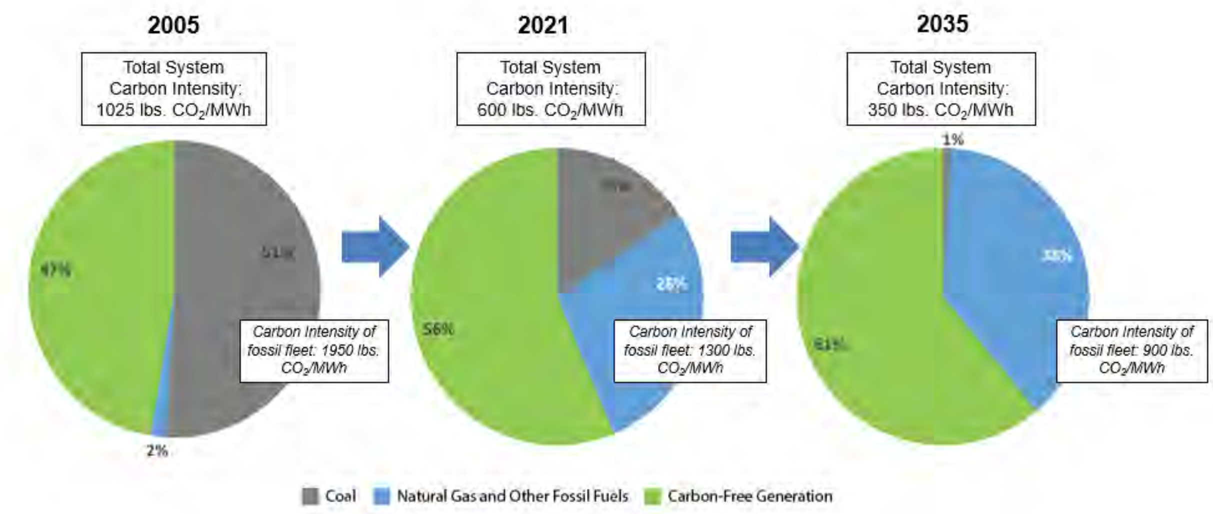
## COMBINED SYSTEM CARBON REDUCTION TRAJECTORY (BASE $CO_2$)

### THE COMBINED DEC / DEP FLEET IS A NATIONAL LEADER IN LOW CARBON INTENSITY ENERGY, WITH A CURRENT RATE 37% LOWER THAN THE INDUSTRY AVERAGE OF 957 LBS. $CO_2$/MWH[5]

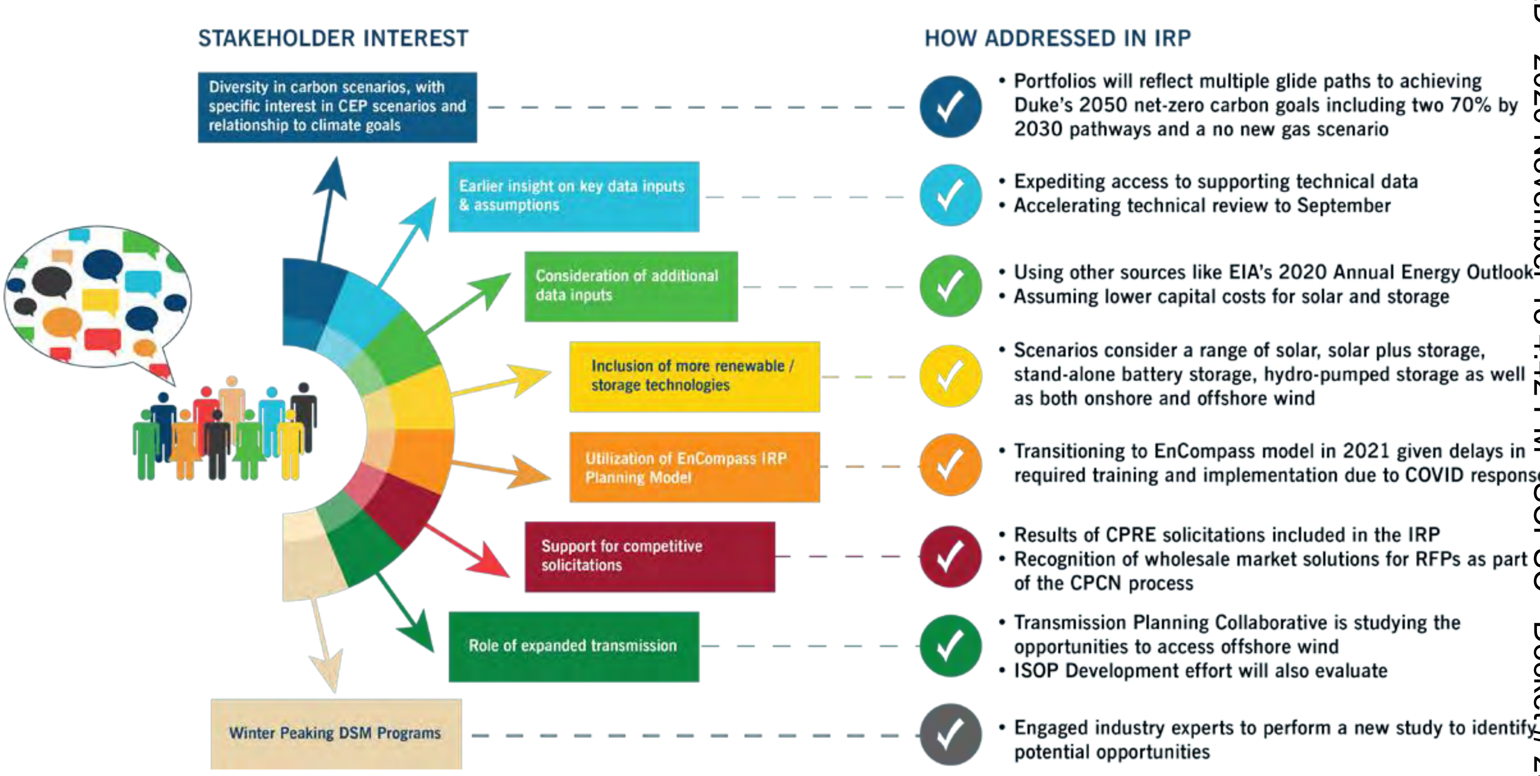



## STAKEHOLDER ENGAGEMENT

As part of the development of the 2020 IRP, Duke Energy actively engaged stakeholders in North Carolina and South Carolina with the objectives of listening, educating and soliciting input to inform the planning process. The Company initiated this engagement with local listening sessions followed by a series of virtual events which were facilitated by ICF,[6] and consisted of an IRP 101 education session and three stakeholder virtual forums, with over 200 participants from stakeholder groups involved across all activities. The forums included presentations and discussions from Duke Energy subject matter experts, and enabled discussion around the areas of greatest interest to stakeholders as identified through listening sessions, and pre- and post-engagement surveys. The sessions drew unique external stakeholder participants from across the Carolinas and provided recommendations in the areas of resource planning, carbon reduction, energy efficiency and demand response. Input from stakeholders helped shape the IRP development, and influenced the evaluation of different pathways

[5] Source: MJ Bradley, "Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States" – July 2020, p. 30.
[6] www.icf.com, ICF, an advisory and professional services company with a specialty in utility sector planning.

in the 2020 IRP. A summary report of these activities was developed by ICF and can be found on Duke Energy's web site.[7].




## 2020 IRP INFORMED BY NEW STUDIES, ILLUSTRATES MULTIPLE PATHWAYS

The 2020 IRP is informed by several new studies and analysis as well as collaboration and input from stakeholders. The analysis and studies in this IRP explore the opportunities and challenges over a range of options for achieving varying trajectories of carbon emission reduction. Specifically, the 2020 IRP highlights six possible portfolios, or plans, within the 15-year planning horizon. These portfolios explore the most economic and earliest practicable paths for coal retirement; acceleration of renewable technologies including solar, onshore and offshore wind; greater integration of battery and pumped-hydro energy storage; expanded energy efficiency and demand response and deployment of new zero-emitting load following resources (ZELFRs) such as small modular reactors (SMRs).

Consistent with regulatory requirements, the base case portfolios evaluate the need for the new resources associated with customer growth and the economic retirement of existing generation under

[7] www.duke-energy.com/irp.

a "no-carbon policy" view and a "with carbon policy" view respectively. These base case portfolios employ traditional least cost planning principles as prescribed in both North Carolina and South Carolina. The remaining plans build upon the carbon base case and were constructed with the assumption of future carbon policy. As described below, and in more detail in Appendix A, these six portfolios show different trajectories for carbon reduction with varying inputs such as coal retirement dates, types of resources and the level and pace of technology adoption rates, as well as contributions from energy efficiency and demand-side management initiatives. All six portfolios were evaluated under combinations of differing carbon and gas prices to test the impact these future scenarios would have on each plan. The results of that scenario analysis, including a table with retirement dates for each portfolio, are presented in Appendix A.

The portfolios also incorporate varying levels of demand-side management programs as an offset to future demand and energy growth. Stakeholders have voiced strong support for these initiatives and the Company has responded by including new conservation programs like Integrated Volt-Var Control (IVVC) which will further support the integration of renewables while also delivering peak and energy demand savings and enhanced reliability for our customers over time, and is further described in Appendix D. With input and support from stakeholders, the Company also undertook a new Winter Peak Shaving study with top consultants in this field. While more work is needed to develop and gain approval for new programs and complementary rate designs, this study provides an increased level of confidence that the high energy efficiency and demand response assumptions used in the portfolios with higher carbon reductions (D - F) could be realized with supportive regulatory policies in place.

The following table outlines the supportive studies used in development of this IRP. These studies cover an array of topical areas with perspective and analysis from some of the industry's leading experts in their respective fields.

### STUDY REQUIREMENTS

| STUDY | STUDY REQUIREMENTS |
|---|---|
| Economic Coal Retirements | • Analysis established the most economic coal unit retirement dates for the Base $CO_2$ and Base No $CO_2$ scenarios. |
| Earliest Practicable Coal Retirements | • Analysis established the earliest feasible coal unit retirement dates. Analysis set aside normal economic considerations and focused on procurement and construction timelines for replacement capacity in order to retire the coal units at the earliest attainable dates. |
| Resource Adequacy Study/ Reserve Margin Study | • Astrapé Consulting study evaluated reliability based on meeting the one day in ten years loss of load expectation (LOLE) metric. |
| Storage Effective Load Carrying Capability (ELCC) Study | • Astrapé Consulting study evaluated capacity value of storage under multiple conditions, including its contribution to winter peak and considerations with increasing levels of renewable penetration. |
| Energy Efficiency and Market Potential Study | • Nexant study evaluated market potential for energy efficiency and demand response initiatives. |
| Winter Specific DR and Rate Design Benchmarking Study | • Being conducted by Tierra Resource Consultants, Proctor Engineering Group, and Dunsky. Studies the integration of new rate designs and DSM technology with innovative program structures to drive winter peak focused reductions. |

## GRID INVESTMENTS

Significant investment in the transmission and distribution system will be required to retire existing coal resources that support the grid and to integrate the incremental resources forecasted in this IRP. While grid investments are critical, ascribing precise cost estimates for individual technologies in the context of an IRP is challenging as grid investments depend on the type and location of the resources that are being added to the system. As described in Appendix A, if replacement generation with similar capabilities is not located at the site of the retiring coal facility, transmission investments will generally first be required to accommodate the unit's retirement in order to maintain regional grid stability. Furthermore, a range of additional transmission network upgrades will be required depending on the type and location of the replacement generation coming onto the grid. To that end, since the level of retirements and replacement resources vary by portfolio, separate estimates of potential required transmission investments are shown and are included in the present value revenue requirements (PVRR) for each of the portfolios. On a combined basis, the transmission investments described further in Chapter 7 have an approximate range of $1 billion in the Base Case portfolios to $9 billion in the No New Gas portfolio. The incremental transmission cost estimates are high level projections and could vary greatly depending on factors such as the precise location of resource additions, specific resource supply and demand characteristics, the amount of new resources being connected at each location, interconnection dependencies, escalation in labor and material costs, changes in interest rates and, potential siting and permitting delays beyond the Company's control. These also do not include the costs of infrastructure upgrades that would be needed on affected third party transmission systems, e.g., other utilities and regional transmission organizations.

With respect to the distribution grid, the Company is working to develop and implement necessary changes to the distribution system to improve resiliency and to allow for dynamic power flows associated with evolving customer trends such as increased penetration of rooftop solar, electric vehicle charging, home battery systems and other innovative customer programs and rate designs. Distribution grid control enhancement investments are foundational across the scenarios in this IRP, improving flexibility to accommodate increasing levels of distribution connected renewable resources while developing a more sustainable and efficient grid. In recognition of the critical role of the transmission and distribution system in an evolving energy landscape, the Company believes it will be critical to modernize the grid as outlined in Chapter 16 and to further develop its Integrated System & Operations Planning (ISOP) framework described in Chapter 15. The Company will use ISOP tools to identify and prioritize future grid investment opportunities that can combine benefits of advanced controls with innovative rate designs and customer programs to minimize total costs across distribution, transmission, and generation.

## TECHNOLOGY, POLICY AND OPERATIONAL CONSIDERATIONS

As depicted further below, portfolios that seek quicker paces of carbon reductions have greater dependency on technology development, such as battery storage, small modular reactors and offshore wind generation, which are at varying levels of maturity and commercial availability[8]. As a result, these portfolios will have a greater dependence on technology advancements and projected future cost reductions, thus requiring near-term supportive energy policies at the state or Federal levels. For

[8] Source: Browning, Morgan S., Lenox, Carol S. "Contribution of offshore wind to the power grid: U.S. air quality. implications." *ScienceDirect,* 2020, https://www.sciencedirect.com/science/article/abs/pii/S0306261920309867.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example, future policy may serve to lower the cost of these emerging technologies to consumers through research and development funding or by providing direct tax incentives to these technologies.

As noted above, all portfolios will require additional grid investments in the transmission and distribution systems to integrate the new resources outlined in each of the portfolios. The portfolio analysis includes estimates of system costs, associated average residential monthly bill impact and operational and executional challenges for each portfolio. When considering these portfolios across both utilities, a combined look is presented below, followed by a DEC only view.

The "Dependency on Technology & Policy Advancement" row in the portfolio results table below reflects a qualitative assessment for each respective portfolio. More shading within a circle indicates a higher degree of dependence on future development of the respective technologies, supporting policy and operational protocols. The Base without Carbon Policy case reflects the current state, with little to no dependence on further technology advancements, policy development, and minimal operational risks. Working from left to right across the table, all other portfolios, including the Base with Carbon Policy case requires policy changes relative to the current state. The 70% $CO_2$ Reduction High Wind case would require supportive policies for expeditious onshore and offshore wind development and associated, necessary transmission build by 2030. The 70% $CO_2$ Reduction High SMR case was included to illustrate the importance of support for advancing these technologies as part of a balanced plan to achieve net-zero carbon. The No New Gas case includes dependence on all factors listed, as well as a much greater dependence on siting, permitting, interconnection and supply chain for battery storage. For the 70% reduction and No New Gas cases, the unprecedented levels of storage that are required to support significantly higher levels of variable energy resources present increased system risks, given that there is no utility experience for winter peaking utilities in the U.S. or abroad with operational protocols to manage this scale of dependence on short-term energy storage.

# DEC / DEP COMBINED SYSTEM PORTFOLIO RESULTS TABLE

| | Base without Carbon Policy | | Base with Carbon Policy | | Earliest Practicable Coal Retirements | | 70% $CO_2$ Reduction: High Wind | | 70% $CO_2$ Reduction: High SMR | | No New Gas Generation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PORTFOLIO | A | | B | | C | | D | | E | | F | |
| System $CO_2$ Reduction (2030 \| 2035)[1] | 56% | 53% | 59% | 62% | 64% | 64% | 70% | 73% | 71% | 74% | 65% | 73% |
| Present Value Revenue Requirement (PVRR) [$B][2] | $79.8 | | $82.5 | | $84.1 | | $100.5 | | $95.5 | | $108.1 | |
| Estimated Transmission Investment Required [$B][3] | $0.9 | | $1.8 | | $1.3 | | $7.5 | | $3.1 | | $8.9 | |
| Total Solar [MW][4, 5] by 2035 | 8,650 | | 12,300 | | 12,400 | | 16,250 | | 16,250 | | 16,400 | |
| Incremental Onshore Wind [MW][4] by 2035 | 0 | | 750 | | 1,350 | | 2,850 | | 2,850 | | 3,150 | |
| Incremental Offshore Wind [MW][4] by 2035 | 0 | | 0 | | 0 | | 2,650 | | 250 | | 2,650 | |
| Incremental SMR Capacity [MW][4] by 2035 | 0 | | 0 | | 0 | | 0 | | 1,350 | | 700 | |
| Incremental Storage [MW][4, 6] by 2035 | 1,050 | | 2,200 | | 2,200 | | 4,400 | | 4,400 | | 7,400 | |
| Incremental Gas [MW][4] by 2035 | 9,600 | | 7,350 | | 9,600 | | 6,400 | | 6,100 | | 0 | |
| Total Contribution from Energy Efficiency and Demand Response Initiatives [MW][7] by 2035 | 2,050 | | 2,050 | | 2,050 | | 3,350 | | 3,350 | | 3,350 | |
| Remaining Dual Fuel Coal Capacity [MW][4, 8] by 2035 | 3,050 | | 3,050 | | 0 | | 0 | | 0 | | 2,200 | |
| Coal Retirements | Most Economic | | Most Economic | | Earliest Practicable | | Earliest Practicable[9] | | Earliest Practicable[9] | | Most Economic[10] | |
| Dependency on Technology & Policy Advancement | ○ | | ◔ | | ◑ | | ◕ | | ● | | ● | |

[1]Combined DEC/DEP System $CO_2$ Reductions from 2005 baseline

[2]PVRRs exclude the cost of $CO_2$ as tax. Including $CO_2$ costs as tax would increase PVRRs by ~$11-$16B. The PVRRs were presented through 2050 to fairly evaluate the capital cost impact associated with differing service lives

[3]Represents an estimated nominal transmission investment; cost is included in PVRR calculation

[4]All capacities are Total/Incremental nameplate capacity within the IRP planning horizon

[5]Total solar nameplate capacity includes 3,925 MW connected in DEC and DEP combined as of year-end 2020 (projected)

[6]Includes 4-hr and 6-hr grid-tied storage, storage at solar plus storage sites, and pumped storage hydro

[7]Contribution of EE/DR (including Integrated Volt-Var Control (IVVC) and Distribution System Demand Response (DSDR)) in 2035 to peak winter planning hour

[8]Remaining coal units are capable of co-firing on natural gas, all coal-only units that rely exclusively on coal are retired before 2030

[9]Earliest Practicable retirement dates with delaying one (1) Belews Creek unit and Roxboro 1&2 to EOY 2029 for integration of offshore wind/SMR by 2030

[10]Most Economic retirement dates with delaying Roxboro 1&2 to EOY 2029 for integration of offshore wind by 2030

**LEGEND:**

- ● Completely dependent
- ◕ Mostly dependent
- ◑ Moderately dependent
- ◔ Slightly dependent
- ○ Not dependent



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DUKE ENERGY CAROLINAS

# DEC PORTFOLIO RESULTS TABLE

| PORTFOLIO | Base without Carbon Policy | | Base with Carbon Policy | | Earliest Practicable Coal Retirements | | 70% $CO_2$ Reduction: High Wind | | 70% $CO_2$ Reduction: High SMR | | No New Gas Generation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | | C | | D | | E | | F | |
| System $CO_2$ Reduction (2030 \| 2035)[1] | 56% | 53% | 59% | 62% | 64% | 64% | 70% | 73% | 71% | 74% | 65% | 73% |
| Average Monthly Residential Bill Impact for a Household Using 1000kWh (by 2030 \| by 2035)[2] | $7 | $23 | $8 | $25 | $13 | $25 | $26 | $47 | $24 | $45 | $12 | $45 |
| Average Annual Percentage Change in Residential Bills (through 2030 \| through 2035)[2] | 0.7% | 1.3% | 0.8% | 1.5% | 1.3% | 1.4% | 2.3% | 2.5% | 2.2% | 2.5% | 1.1% | 2.4% |
| Present Value Revenue Requirement (PVRR) [$B][3] | $44.4 | | $46.8 | | $46.8 | | $56.1 | | $53.6 | | $56.0 | |
| Estimated Transmission Investment Required [$B][4] | $0.6 | | $1.0 | | $0.7 | | $4.3 | | $2.1 | | $2.7 | |
| Total Solar [MW][5, 6] by 2035 | 3,700 | | 5,950 | | 5,950 | | 8,450 | | 8,450 | | 8,450 | |
| Incremental Onshore Wind [MW][5] by 2035 | 0 | | 150 | | 0 | | 1,100 | | 1,100 | | 1,400 | |
| Incremental Offshore Wind [MW][5] by 2035 | 0 | | 0 | | 0 | | 1,350 | | 150 | | 150 | |
| Incremental SMR Capacity [MW][5] by 2035 | 0 | | 0 | | 0 | | 0 | | 700 | | 700 | |
| Incremental Storage [MW][5, 7] by 2035 | 350 | | 600 | | 600 | | 2,400 | | 2,400 | | 2,400 | |
| Incremental Gas [MW][5] by 2035 | 4,300 | | 3,050 | | 5,650 | | 4,300 | | 3,950 | | 0 | |
| Total Contribution from Energy Efficiency and Demand Response Initiatives [MW][8] by 2035 | 1,225 | | 1,225 | | 1,225 | | 1,850 | | 1,850 | | 1,850 | |
| Remaining Dual Fuel Coal Capacity [MW][5, 9] by 2035 | 3,050 | | 3,050 | | 0 | | 0 | | 0 | | 2,200 | |
| Coal Retirements | Most Economic | | Most Economic | | Earliest Practicable | | Earliest Practicable[10] | | Earliest Practicable[10] | | Most Economic | |
| Dependency on Technology & Policy Advancement | ○ | | ◔ | | ◑ | | ◕ | | ● | | ● | |

[1]Combined DEC/DEP System $CO_2$ Reductions from 2005 baseline

[2]Represents specific IRP portfolio's incremental costs included in IRP analysis; does not include complete costs for other initiatives that are constant throughout the IRP or that may be pending before state commissions

[3]PVRRs exclude the cost of $CO_2$ as tax. Including $CO_2$ costs as tax would increase PVRRs by ~$5-$8B. The PVRRs were presented through 2050 to fairly evaluate the capital cost impact associated with differing service lives

[4]Represents an estimated nominal transmission investment; cost is included in PVRR calculation

[5]All capacities are Total/Incremental nameplate capacity within the IRP planning horizon

[6]Total solar nameplate capacity includes 975 MW connected in DEC as of year-end 2020 (projected)

[7]Includes 4-hr and 6-hr grid-tied storage, storage at solar plus storage sites, and pumped storage hydro

[8]Contribution of EE/DR (including Integrated Volt-Var Control (IVVC) and Distribution System Demand Response (DSDR)) in 2035 to peak winter planning hour

[9]Remaining coal units are capable of co-firing on natural gas, all coal-only units that rely exclusively on coal are retired before 2030

[10]Earliest Practicable retirement dates with delaying one (1) Belews Creek unit to EOY 2029 for integration of offshore wind/SMR by 2030

LEGEND:

● Completely dependent

◕ Mostly dependent

◑ Moderately dependent

◔ Slightly dependent

○ Not dependent



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## CUSTOMER FINANCIAL IMPACTS

The Company is committed to the provision of affordable electricity for the residents, businesses, industries and communities served by DEC across its Carolinas' footprint. For each of the six portfolios analyzed, the IRP shows a high level projected present value of long-term revenue requirements and an average residential monthly bill impact across the Company's combined North and South Carolina service territory. Portfolios that have earlier and more aggressive adoption of technologies that are at earlier stages of development in the U.S., such as offshore wind or SMR generators, demonstrate or produce incrementally larger costs (revenue requirements) and bill impacts, but achieve carbon reductions at a more aggressive pace. While the IRP forecasts potential incremental system revenue requirement and system residential bill impact differences associated with each of the various scenarios analyzed in the IRP, it is recognized that these forecasts will change over time with evolving market conditions and policy mandates. Seeking the appropriate pace of technology adoption to achieve carbon reduction objectives requires balancing affordability while maintaining a reliable energy supply. The Company is actively engaged in soliciting stakeholder input into the planning process and is participating in the policy conversation to strike the proper balance in achieving progressive carbon reduction goals that align with customer expectations while also maintaining affordable and reliable service. Finally, cost and bill impacts presented are associated with incremental resource retirements, additions, and demand-side activities identified in the IRP and as such do not include potential efficiencies or costs in other parts of the business. Factors such as changing cost of capital, and changes in other costs will also influence future energy costs and will be incorporated in future IRP forecasts as market conditions evolve. Finally, future cost of service allocators and rate design will impact how these costs are spread among the customer classes and, therefore, customer bill impacts.

## BASE CASES

The IRP reflects two base cases, each developed with a different assumption on carbon policy. The first case assumes no carbon policy, which is the current state today. Alternatively, the second base case assumes a policy that effectively puts a price on carbon emissions from power generation, with pricing generally in line with various past or current legislative initiatives, to incentivize lower carbon resource selection and dispatch decisions needed to support a trajectory to net-zero $CO_2$ emissions by 2050. Given the uncertainties associated with how a carbon policy may be designed, the 2020 IRP carbon policy includes a cost adder on carbon emissions in resource selection as well as daily operations, effectively a "shadow price" on $CO_2$ emissions. This "shadow price" is a generic proxy that could represent the effects of a carbon tax, price of emissions allowances, or a price signal needed to meet a given clean energy standard. Given the uncertainty of the ultimate form of policy, the cost and rate impacts shown only reflect the cost of the resources that would be required to achieve carbon reduction and not the "shadow price" itself. Customers could bear an additional cost if carbon policy takes the form of a carbon tax.

In accordance with regulatory requirements of both North Carolina and South Carolina, the base cases apply least cost planning principles when determining the optimal mix of resources to meet customer demand. It should be noted that even the Base Case without Carbon Policy includes results that more than double the amount of solar connected to the DEC and DEP system today. In addition, the Base Case without Carbon Policy includes approximately 1,000 MW of battery storage across the two utilities, which is slightly above the total amount in operation in the U.S. today (source: EIA[9]). The inclusion of a price on carbon emissions drives outcomes that include higher integration of solar, wind, and storage resources when compared to the case that excludes a carbon price. Both pathways utilize the most economic coal retirement date assumption, rather than relying on the depreciable lives of the coal assets as was the case in previous IRPs.

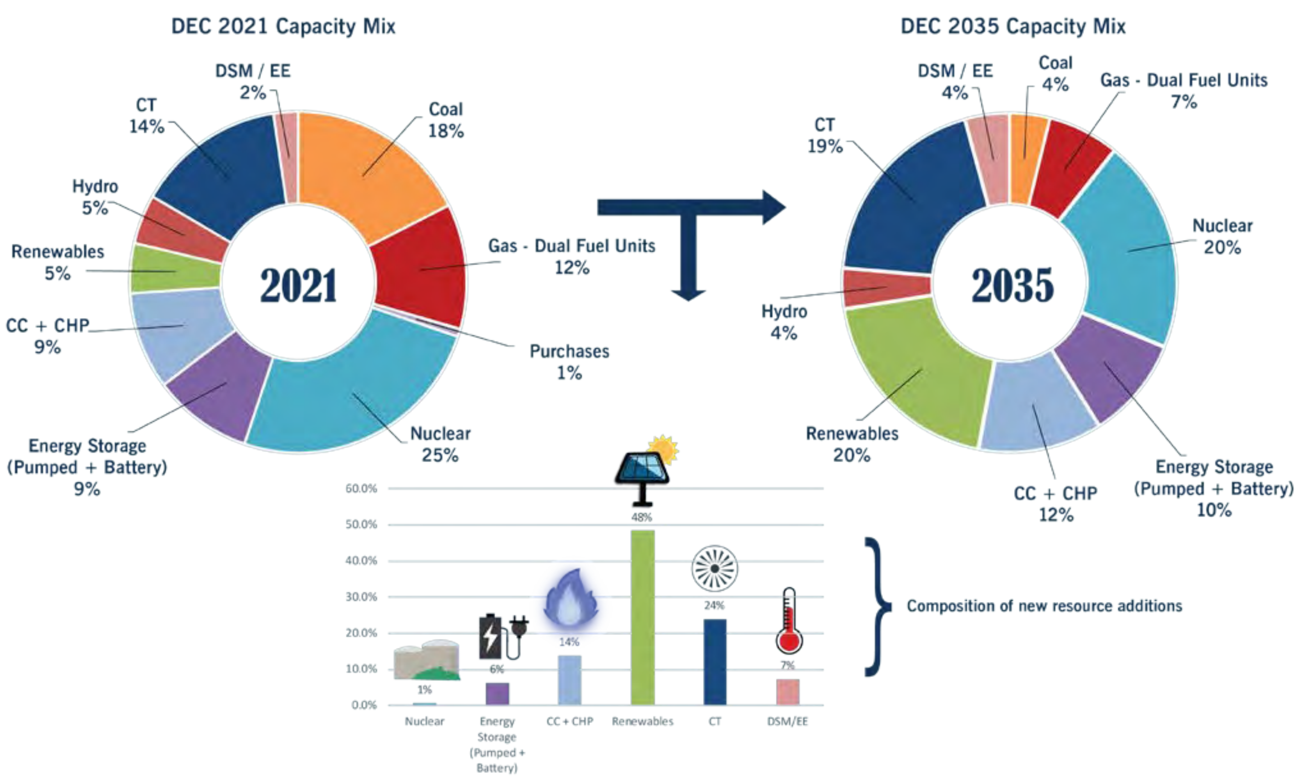
In the Company's base cases, across DEC and DEP combined, all units that operate exclusively on coal would be retired by 2030. The only remaining units that would continue to operate would be dual-fuel units with operation primarily on lower carbon natural gas. By 2035, 7,000 MW of coal-units representing 17% of nameplate capacity across the DEC and DEP system would retire, with the only remaining dual-fuel units of Cliffside 6 and Belews Creek 1 &2 operating through the remainder of their economic lives primarily on lower carbon natural gas. Under these base cases, DEP retires all 3,200 MW of coal capacity by 2030 and DEC retires approximately 3,800 MW of coal capacity by 2035. The remaining units can continue to provide valuable generation capacity to meet peak demand, with generation making up approximately less than 5% of the energy served by DEC and DEP combined by 2035.

The Company's investment to allow for use of lower carbon natural gas at certain coal sites provides a benefit to customers by optimizing existing infrastructure. This dual-fuel capability also improves operational flexibility to accommodate renewables by lowering minimum loads and improving ramp rates while also reducing carbon emissions over the remaining life of the assets. These base case

[9] https://www.eia.gov/analysis/studies/electricity/batterystorage/pdf/battery_storage.pdf.

portfolios serve as the benchmark for comparing the incremental costs and benefits of alternative more aggressive carbon reduction scenarios. The figure below illustrates how DEC's capacity mix changes over the 2021 through the 2035 period in the Base Case with carbon policy. For example, renewables make up 48% of the incremental resources added between 2021 and 2035, raising the proportion of renewables in the overall fleet to 20% by 2035.

### CHANGE IN INSTALLED CAPACITY[10]




## EARLIEST PRACTICABLE COAL RETIREMENTS

For comparison purposes, the Earliest Practicable Retirement case suspends traditional "least cost" economic planning considerations and evaluates the physical feasibility of retiring all the Company's 10,000 MW of coal generation sites within DEC and DEP as early as practicable when taking into consideration the timing required to put replacement resources and supporting infrastructure into

[10] Change in capacity from the Base Case with Carbon Policy portfolio.

service. Aggressive levels of new solar, wind and battery storage were also utilized in this portfolio to accelerate the retirement of a portion of existing coal generation while also reducing the need for incremental gas infrastructure. In determining the "earliest practicable" coal retirement dates, this case considers the siting, permitting, regulatory approval and construction timeline for replacement resources as well as supporting infrastructure such as new transmission and new gas transportation infrastructure. This case assumes the majority of dispatchable resources are replaced at the coal retiring facilities to minimize the resources needed and time associated with additional land acquisition as well as transmission and gas infrastructure that would be required. This approach enables a more rapid transition from coal to lower carbon technologies while maintaining appropriate planning reserves for reliability.

Under this portfolio, all coal units in DEC and DEP would be retired by 2030 with the exception of DEC's Cliffside 6 unit, which would take advantage of its current dual fuel capability and switch to 100% natural gas by 2030. In the aggregate across DEC and DEP, this portfolio includes a diverse mix of over 20,000 MW of new resources being placed in service. This diverse mix results in a combined system carbon reduction of 64% by 2030 while mitigating overall costs and bill impacts by leveraging existing infrastructure associated with the current coal fleet. Finally, while "practicable" from a technical perspective, the sheer magnitude, pace and array of technologies included in this portfolio with approximately half coming from renewable wind and solar resources and half from dispatchable gas, make it evident that new supportive energy policy and regulations would be required to effectuate such a rapid transition.

## 70% GHG REDUCTION CASES

This IRP also details two cases to achieve a more aggressive carbon reduction goal, such as the goal to achieve 70% greenhouse gas emission reductions from the electric sector by 2030, which is under evaluation in the development of the North Carolina Clean Energy Plan. Achieving these targets will require the addition of diverse, new types of carbon-free resources as well as additional energy storage to replace the significant level of energy and capacity currently supplied by coal units. To support this pace of carbon reduction, this case assumes the same coal unit retirement dates as the "earliest practicable" case, with the exception of shifting the retirement date of one of the Belews Creek units and Roxboro 1&2 units to the end of 2029 to allow for the integration of new carbon free resources by 2030. The resource portfolios in the 70% $CO_2$ reduction scenarios reflect an accelerated utilization



**Snider DEC Exhibit 2**

of technologies that are yet to be commercially demonstrated at scale in the United States and may be challenging to bring into service by the 2030 timeframe.

For the purposes of this IRP, the Company evaluated the emerging carbon free technologies that are furthest along the development and deployment curves – Carolinas offshore wind and small modular nuclear reactors. Adding this level of new carbon free resources prior to 2030 will require the adoption of supportive state policies in both North Carolina and South Carolina. It will also require extensive additional analysis around the siting, permitting, interconnection, system upgrades, supply chain and operational considerations of more significant amounts of intermittent resources and much greater dependence on energy storage on the system. The High SMR case also assumes that SMRs are in service by 2030. However, the challenges with integrating a first of a kind technology in a relatively compressed timeframe are significant. Therefore, these cases are intended to illustrate the importance of advancing such technologies as part of a blended approach that considers a range of carbon-free technologies to allow deeper carbon reductions. When comparing and contrasting the two portfolios, differences in resource characteristics, projected future views on technology costs, associated transmission infrastructure requirements and dependencies on federal regulations and legislation all influence the pace and resource mix that is ultimately adopted in the Carolinas. An examination of two alternate portfolios that achieve 70% carbon reduction by 2030 highlight some of these key considerations for stakeholders. As discussed in Chapter 16, the Company is actively promoting the further development of future carbon free technologies which are a prerequisite to a net-zero future.

## NO NEW GAS GENERATION

In response to stakeholder interest in a No New Gas case, the Company evaluated the characteristics of an energy system that excludes the addition of new gas generating units from the future portfolio. coal retirement dates reflected in the base case with the exception of Roxboro 1&2 which are delayed to the end of 2029 to allow for integration of offshore wind by 2030. Similar to the 70% $CO_2$ reduction cases, this resource portfolio is highly dependent upon the development of diverse, new carbon-free sources and even larger additions of energy storage and offshore wind as well as the adoption of supportive policies at the state and federal level. Also similar to the 70% case, the No New Gas case would require additional analysis around the siting, permitting, interconnection, system upgrades, supply chain integration and operational considerations of bringing on significant amounts of intermittent resources onto the system. Notably, the heavier reliance on large-scale battery energy storage in this scenario would require significant additional analysis and study since this technology



Snider DEC Exhibit 2

is emergent with very limited history and limited scale of deployment on power grids worldwide. To provide a sense of scale, at the combined system level it would require approximately 1,100 acres of land, or more than 830 football fields to support the amount of batteries in this portfolio and would represent over six times the amount of large-scale battery storage currently in service in the United States. The lack of meaningful industry experience with battery storage resources at this scale presents significant operational considerations that would need to be resolved prior to deployment at such a large scale, which is addressed further in Chapter 16.

Finally, in the combined DEC and DEP view, the No New Gas case is estimated to have the highest customer cost impacts primarily due to the magnitude of early adoption of emerging carbon free technologies and the significant energy storage and transmission investments required to support those technologies. As is the case with almost all technologies, improvements in performance and reductions in cost are projected to occur over time. Without the deployment of new efficient natural gas resources as one component of a long-term decarbonization strategy, the system must run existing coal units longer to allow emerging technologies to evolve from both a technological and an economic perspective. In the alternative, the acceleration of coal retirements without some consideration of new efficient natural gas as a transition resource forces the large-scale adoption of such technologies before they have a chance to mature and decline in price, resulting in higher costs and operational risks for consumers. The summary table highlights the fact that this scenario is dependent on significant technological advances and new policy initiatives that would seek to recognize and address these considerations prior to implementation.

## KEY ASSUMPTIONS

The following table provides an overview of the key assumptions applied to our modeling and analysis with comparisons to 2019 IRP. In addition, the company runs a number of sensitivities, such as high and low load growth, energy efficiency and renewable integration levels that demonstrate the impact of changes in various assumptions.



**Snider DEC Exhibit 2**

## KEY ASSUMPTIONS TABLE

| TOPIC AREA | 2019 IRP | 2020 IRP | NOTES |
|---|---|---|---|
| Load Forecast | **DEC:** 0.8% Winter Peak Demand CAGR **DEP:** 0.9% Winter Peak Demand CAGR | **DEC:** 0.6% Winter Peak Demand CAGR **DEP:** 0.9% Winter Peak Demand CAGR | Lower load growth due to economic factors and refinements of historical load data. |
| Reserve Margin | 17% | 17% | New LOLE Study reaffirms 17% strikes the appropriate balance between cost and reliability |
| Solar (Single Axis Tracking) | 37% cost decline through 2030 | 42% cost decline through 2030 | 7% lower year one cost compared to 2019 IRP |
| 4-hour Battery Storage | 54% cost decline through 2030 | 49% cost decline through 2030 | 32% lower year one cost compared to 2019 IRP |
| Onshore Wind | 12% cost decline through 2030 | 11% cost decline through 2030 | 7% lower year one cost compared to 2019 IRP; For the first time, wind allowed to be economically selected in planning process |
| Offshore Wind | N/A | 40% cost decline through 2030 | For the first time, offshore wind is considered in the planning horizon |
| Natural Gas | 17% cost decline through 2030 | 17% cost decline through 2030 | No Material Change |
| Coal | Retired based on depreciable lives at the time of the IRP | Retired based on analysis for most economic and earliest practicable retirement dates | Scenarios consider earliest practicable and most economic |
| New Nuclear | SMRs discussed but not screened for selection | SMRs included for selection | For the first time, SMRs available to be economically selected as a resource |

## EXECUTIVE SUMMARY CONCLUSION

DEC remains focused on transitioning to a cleaner energy future, advancing climate goals that are important to its customers and stakeholders, while continuing to deliver affordable and reliable service. The 2020 IRP reflects multiple potential future pathways towards these goals. An analysis of each case reflects the associated benefits and costs with each portfolio as well as challenges that would need to be addressed with more aggressive carbon reduction scenarios. This range of portfolios helps illustrate the benefits of a diverse resource mix to assure the reliability of the system and efficiently support the transition toward a carbon-free resource mix. Public policies and the advancement of new, innovative technologies will ultimately shape the pace of the ongoing energy transformation. Duke Energy looks forward to continued engagement and collaboration with stakeholders to chart a path forward that balances affordability, reliability and sustainability.

# 1 EXECUTIVE SUMMARY

As one of the largest investor-owned utilities in the country, Duke Energy has a strong history of delivering affordable, reliable and increasingly cleaner energy to our customers. In planning for the future, the Company is transforming the way it does business by investing in increasingly cleaner resources, modernizing the grid and transforming the customer experience. Duke Energy Progress (DEP), a public utility subsidiary of Duke Energy, owns nuclear, coal, natural gas, renewables and hydroelectric generation. That diverse fuel mix provides about 13,700 megawatts (MW) of owned electricity capacity to 1.6 million customers in a 29,000 square-mile service area of North Carolina and South Carolina.

As required by North Carolina Utilities Commission (NCUC) Rule R8-60 and subsequent orders, the Public Service Commission of South Carolina (PSCSC) and The Energy Freedom Act (Act 62) in South Carolina, Duke Energy Progress is submitting its 2020 Integrated Resource Plan (IRP). The IRP balances resource adequacy and capacity to serve anticipated peak electrical load, consumer affordability and least cost, as well as compliance with applicable state and federal environmental regulations. The IRP details potential resource portfolios to match forecasted electricity requirements, including an appropriate reserve margin, to maintain system reliability for customers over the next 15 years. In addition to meeting regulatory and statutory obligations, the IRP is intended to provide insight into the Company's planning processes.

DEP operates as a single utility system across both states and is filing a single system IRP in both North Carolina and South Carolina. As such, the quantitative analysis contained in both the North Carolina and South Carolina filings is identical, although certain sections dealing with state-specific issues such as state renewable standards or environmental standards may be unique to individual state requirements. The IRP to be filed in each state is identical in form and content. It is important to note that DEP cannot fulfill two different IRPs for one system. Accordingly, it is in customers' and the Company's interest that the resulting IRPs accepted or approved in each state are consistent with one another.

In alignment with the Company's climate strategy, input from a diverse range of stakeholders, and other policy initiatives, the 2020 IRP projects potential pathways for how the Company's resource portfolio may evolve over the 15-year period (2021 through 2035) based on current data and assumptions across a variety of scenarios. As a regulated utility, the Company is obligated to develop an IRP based on the policies in effect at that time. As such, the IRP includes a base plan without carbon policy that represents existing policies under least-cost planning principles. To show the impact potential new policies may have on future resource additions and in response to stakeholder feedback, the 2020 IRP also introduces a variety of portfolios that evaluate more aggressive carbon emission reduction targets. As described throughout the IRP, these portfolios have trade-offs between the pace of carbon reductions weighted against the associated cost and operational considerations. These portfolios will ultimately be shaped by the pace of carbon reduction targeted by future policies and the rate of maturation of new, clean technologies.

Inputs to the IRP modeling process, such as load forecasts, fuel and technology price curves and other factors are derived from multiple sources including third party providers such as Guidehouse, IHS, Burns and McDonnell, and other independent sources such as the Energy Information Administration (EIA) and National Renewable Energy Laboratory (NREL). These inputs reflect a "snapshot in time," and modeling results and resource portfolios will evolve over time as technology costs and load forecasts change. The plan includes different resource portfolios with different assumptions around coal retirement and carbon policy but recognizes that the modeling process is limited in its ability to consider all potential policy changes and lacks perfect foresight of other variables such as technology advancements and economic factors. To the extent these factors change over time, future resource plans will reflect those changes.

To further inform the Company's planning efforts, in 2019, Duke Energy contracted with NREL[1] to conduct a Carbon-Free Resource Integration Study[2] to evaluate the planning and operational considerations of integrating increasing levels of carbon-free resources onto the Duke Energy Carolinas and Duke Energy Progress systems. Phase 1 of the study[3] has helped inform some of the renewable resource assumptions and reinforced the benefits that a diverse portfolio can provide when integrating carbon-free generation on the system. Phase 2 of the NREL study is underway now. This study is being informed by stakeholder input and will provide a more granular analysis to understand the integration, reliability and operational challenges and opportunities for integrating carbon-free resources and will inform future IRPs and planning efforts.

In accordance with North Carolina and South Carolina regulatory requirements, the 2020 IRP includes a most economic or "least-cost" portfolio, as well as multiple scenarios reflecting a range of potential future resource portfolios. These portfolios compare the carbon reduction trajectory, cost, operability and execution implications of each portfolio to support the regulatory process and inform public policy dialogue. In North Carolina, Duke Energy is an active participant in the state's Clean Energy Plan stakeholder process, which is evaluating policy pathways to achieve a 70% reduction in greenhouse gas emissions from 2005 levels by 2030 and carbon neutrality for the electric power sector by 2050. Accordingly, this year's IRP includes two resource portfolios that illustrate potential pathways to achieve 70% $CO_2$ reduction by 2030, though both scenarios would require supportive state policies in North Carolina and South Carolina. All portfolios keep Duke Energy on a trajectory to meet its near-term enterprise carbon-reduction goal of at least 50% by 2030 and long-term goal of net-zero by 2050. These portfolios would also enable the Company to retire all units that rely exclusively on coal by 2030. Looking beyond the planning horizon, the 2020 IRP includes a section that provides a qualitative overview of how technologies, analytical tools and processes, and the grid will need to evolve to achieve the Company's net-zero 2050 $CO_2$ goal. Duke Energy welcomes the opportunity to work constructively with policymakers and stakeholders to address technical and practical issues associated with these scenarios.

Act 62, which was signed into law in South Carolina on May 16, 2019, sets out minimum requirements for each utility's IRP. The 2020 IRP contains the necessary information required by

[1] "An industry-respected, leading research institution that advances the science and engineering of energy efficiency, sustainable transportation and renewable power technologies", www.nrel.gov.

[2] https://www.nrel.gov/grid/carbon-free-integration-study.html.

[3] https://www.nrel.gov/grid/carbon-free-integration-study.html.

Act 62, including, the utility's long-term forecast of sales and peak demand under various scenarios, projected energy purchased or produced by the utility from renewable energy resources, and a summary of the electrical transmission investments planned by the utility. The IRP also includes resource portfolios developed with the purpose of fairly evaluating the range of demand side, supply side, storage, and other technologies and services available to meet the utility's service obligations. Consistent with Act 62 and NC requirements, the IRP balances the following factors: resource adequacy and capacity to serve anticipated peak electrical load with applicable planning reserve margins; consumer affordability and least cost; compliance with applicable state and federal environmental regulations; power supply reliability; commodity price risks; and diversity of generation supply.

## EXECUTIVE SUMMARY

Duke Energy's history of delivering reliable, affordable and increasingly cleaner energy to its customers in the Carolinas stems back to the early 1900's, when visionaries harnessed the natural resource of the Catawba River to develop an integrated system of hydropower plants that provided the electricity to attract new industries to the region. As the population in the Carolinas has grown and energy demand increased, the Company has worked collaboratively with customers and other stakeholders to invest in a diverse portfolio of generation resources, enabled by an increasingly resilient grid, to respond to the region's growing energy needs and economic growth.

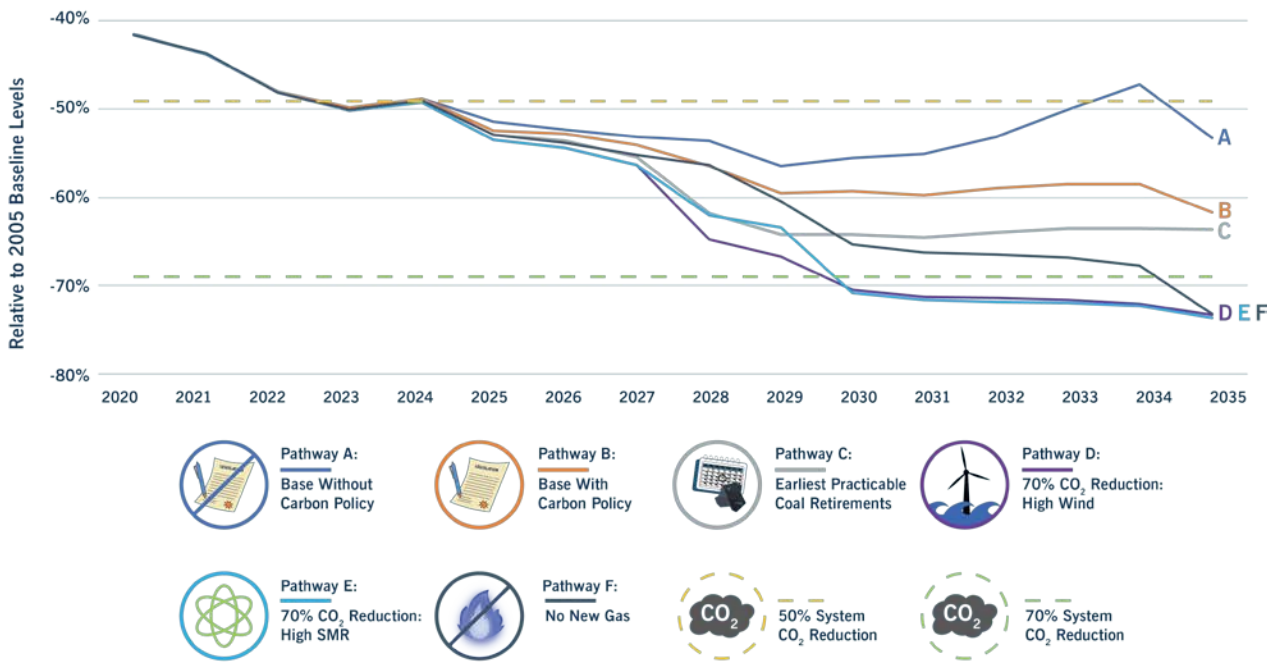
Today, Duke Energy Progress (DEP) serves approximately 1.6 million customers. Over the 15-year planning horizon, the Company projects the addition of 264,000 new customers in DEP contributing to 1,850 MW of additional winter peak demand on the system. Even with the expansion of energy efficiency and demand reduction programs contributing to declining per capita energy usage, cumulative annual energy consumption is expected to grow by approximately 7,050 GWh between 2021 and 2035 due to the projected population and household growth that exceeds the national average. This represents an annual winter peak demand growth rate of 0.9% and an annual energy growth rate of 0.8%. In addition to growing demand, DEP is planning for the potential retirement of some of its older, less efficient generation resources, creating an additional need of at least 3,950 MW over the 15-year planning horizon. After accounting for the required reserve margin, approximately 6,200 MW of new resources are projected to be needed over the 15-year planning horizon.

While growing, DEP is projecting slightly lower load growth compared to the 2019 IRP due to a somewhat weaker economic outlook, the addition of 2019 peak history showing declines in commercial and Industrial energy sales, and other refinements to the forecasting inputs. Additionally, due to the timing of the spring 2020 load forecast, which was developed using Moody's economic inputs as of January 2020, and the lack of relevant historical data upon which to base forecast adjustments, the potential impacts of COVID-19 are not incorporated in this forecast. Based on summer 2020 demand observations to date, however, it appears that the COVID-19 impact to peak demand is relatively insignificant. The Company will continue to monitor the impacts from the pandemic, including the higher residential demand and changing usage patterns, as well as the projected macroeconomic implications and incorporate changes to the long-term planning assumptions in future IRPs.

## REDUCING GHG EMISSIONS

In 2019, Duke Energy announced a corporate commitment to reduce $CO_2$ emissions by at least 50% from 2005 levels by 2030, and to achieve net-zero by 2050. This is a shared goal important to the Company's customers and communities, many of whom have also developed their own clean energy initiatives. As one of the largest investor-owned utilities in the U.S., the goal to attain a net-zero carbon future represents one of the most significant reductions in $CO_2$ emissions in the U.S. power sector. The development of the Company's IRP and climate goals are complementary efforts, with the IRP serving as a road map that provides the analysis and stakeholder input that will be required to achieve carbon reductions over time. All pathways included in the 2020 IRP keep Duke Energy on a trajectory to meet its carbon goals over the 15-year planning horizon.

## COMBINED CARBON REDUCTION BY SCENARIO

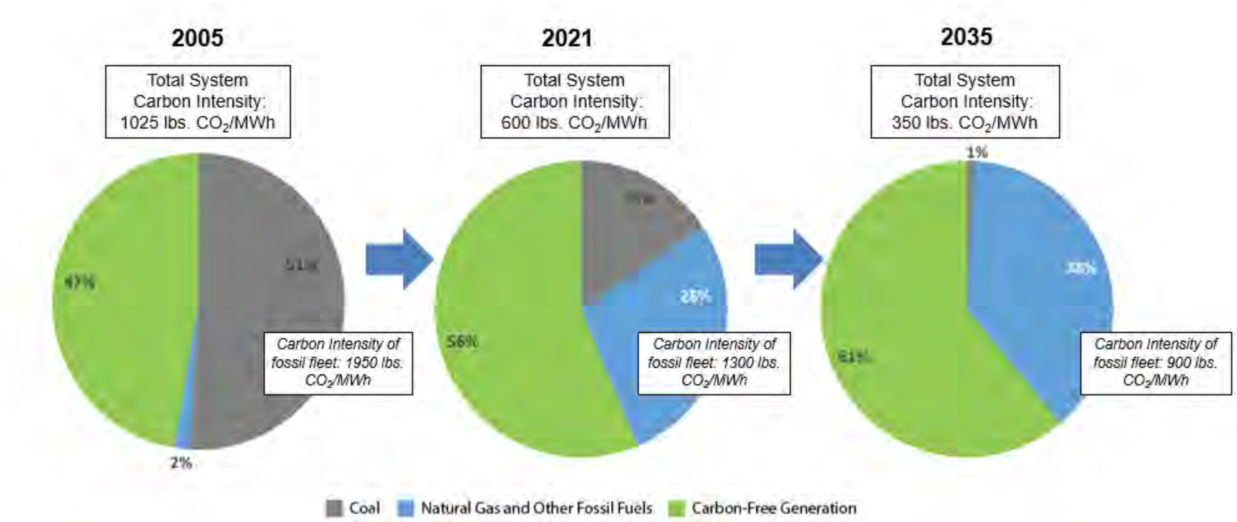



DEP has a strong historic commitment to carbon-free resources such as nuclear, hydro-electric and solar resources. In addition, as described in Appendix D, DEP provides customers with an expansive portfolio of energy efficiency and demand-side management program offerings. In total, DEP and Duke Energy Carolinas (DEC), through their Joint Dispatch Agreement (JDA), serve more than half of the energy needs of their customers with carbon free resources, making the region a national leader in carbon-free generation.

Combined, DEP and DEC operate six nuclear plants and 26 hydro-electric facilities in the Carolinas with winter capacities of over 11,000 MW and 3,400 MW respectively. In 2018, Duke Energy's nuclear fleet provided half of our customers' electricity in the Carolinas, avoiding the release of about 54 million tons of carbon dioxide, or equivalent to keeping more than 10 million passenger cars off the road. As the Company meets its customers' future energy needs and reduces its carbon footprint, it is seeking to renew the licenses of 11 nuclear units it operates at six plant sites in the Carolinas. This provides the option to operate these plants for an additional 20 years. In addition, DEP and DEC purchase or own approximately 4,000 MW of solar generation coming from approximately 1,000 solar facilities throughout the Carolinas. In DEP, where a large portion of energy has historically been sourced from carbon-free resources, the Company has reduced $CO_2$ emissions by 41% since 2005. In addition to a leadership position in absolute emission reductions, energy produced from the combined DEP/DEC fleet has one of the lowest carbon-intensities in the country. With a current $CO_2$ emissions rate of just over 600 pounds /megawatt-hour, the combined Carolinas' fleet ranks among the nation's top utilities for the provision of low carbon-intensive energy.[4] The following figure illustrates how the Company is building on its leadership position through the addition of carbon free resources such as solar and wind while also reducing the emissions profile and carbon intensity of remaining fossil generation by reducing dependence on coal and increasing utilization of more efficient, less carbon intense, natural gas resources.

### COMBINED SYSTEM CARBON REDUCTION TRAJECTORY (BASE $CO_2$)

### THE COMBINED DEC / DEP FLEET IS A NATIONAL LEADER IN LOW CARBON INTENSITY ENERGY, WITH A CURRENT RATE 37% LOWER THAN THE INDUSTRY AVERAGE OF 957 LBS. $CO_2$/MWH[5]




## STAKEHOLDER ENGAGEMENT

As part of the development of the 2020 IRP, Duke Energy actively engaged stakeholders in North Carolina and South Carolina with the objectives of listening, educating and soliciting input to inform

[4] Source: MJ Bradley, "Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States" – July 2020, p. 30.

[5] Source: MJ Bradley, "Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States" – July 2020, p. 30.

from stakeholders. The analysis and studies in this IRP explore the opportunities and challenges over a range of options for achieving varying trajectories of carbon emission reduction. Specifically, the 2020 IRP highlights six possible portfolios, or plans, within the 15-year planning horizon. These portfolios explore the most economic and earliest practicable paths for coal retirement; acceleration of renewable technologies including solar, onshore and offshore wind; greater integration of battery and pumped-hydro energy storage; expanded energy efficiency and demand response and deployment of new zero-emitting load following resources (ZELFRs) such as small modular reactors (SMRs).

Consistent with regulatory requirements, the base case portfolios evaluate the need for the new resources associated with customer growth and the economic retirement of existing generation under a “no-carbon policy” view and a “with carbon policy” view respectively. These base case portfolios employ traditional least cost planning principles as prescribed in both North Carolina and South Carolina. The remaining plans build upon the carbon base case and were constructed with the assumption of future carbon policy. As described below, and in more detail in Appendix A, these six portfolios show different trajectories for carbon reduction with varying inputs such as coal retirement dates, types of resources and the level and pace of technology adoption rates, as well as contributions from energy efficiency and demand-side management initiatives. All six portfolios were evaluated under combinations of differing carbon and gas prices to test the impact these future scenarios would have on each plan. The results of that scenario analysis, including a table with retirement dates for each portfolio, are presented in Appendix A.

The portfolios also incorporate varying levels of demand-side management programs as an offset to future demand and energy growth. Stakeholders have voiced strong support for these initiatives and the Company has responded by including new conservation programs like Integrated Volt-Var Control (IVVC) which will further support the integration of renewables while also delivering peak and energy demand savings and enhanced reliability for our customers over time, and is further described in Appendix D. With input and support from stakeholders, the Company also undertook a new Winter Peak Shaving study with top consultants in this field. While more work is needed to develop and gain approval for new programs and complementary rate designs, this study provides an increased level of confidence that the high energy efficiency and demand response assumptions used in the portfolios with higher carbon reductions (D - F) could be realized with supportive regulatory policies in place.

The following table outlines the supportive studies used in development of this IRP. These studies cover an array of topical areas with perspective and analysis from some of the industry's leading experts in their respective fields.

### STUDY REQUIREMENTS

| STUDY | STUDY REQUIREMENTS |
|---|---|
| Economic Coal Retirements | • Analysis established the most economic coal unit retirement dates for the Base $CO_2$ and Base No $CO_2$ scenarios. |
| Earliest Practicable Coal Retirements | • Analysis established the earliest feasible coal unit retirement dates. Analysis set aside normal economic considerations and focused on procurement and construction timelines for replacement capacity in order to retire the coal units at the earliest attainable dates. |
| Resource Adequacy Study/ Reserve Margin Study | • Astrapé Consulting study evaluated reliability based on meeting the one day in ten years loss of load expectation (LOLE) metric. |
| Storage Effective Load Carrying Capability (ELCC) Study | • Astrapé Consulting study evaluated capacity value of storage under multiple conditions, including its contribution to winter peak and considerations with increasing levels of renewable penetration. |
| Energy Efficiency and Market Potential Study | • Nexant study evaluated market potential for energy efficiency and demand response initiatives. |
| Winter Specific DR and Rate Design Benchmarking Study | • Being conducted by Tierra Resource Consultants, Proctor Engineering Group, and Dunsky. Studies the integration of new rate designs and DSM technology with innovative program structures to drive winter peak focused reductions. |

## GRID INVESTMENTS

Significant investment in the transmission and distribution system will be required to retire existing coal resources that support the grid and to integrate the incremental resources forecasted in this IRP. While grid investments are critical, ascribing precise cost estimates for individual technologies in the context of an IRP is challenging as grid investments depend on the type and location of the resources that are being added to the system. As described in Appendix A, if replacement generation with similar capabilities is not located at the site of the retiring coal facility, transmission investments will generally first be required to accommodate the unit's retirement in order to maintain regional grid stability. Furthermore, a range of additional transmission network upgrades will be required depending on the type and location of the replacement generation coming onto the grid. To that end, since the level of retirements and replacement resources vary by portfolio, separate estimates of potential required transmission investments are shown and are included in the present value revenue requirements (PVRR) for each of the portfolios. On a combined basis, the transmission investments described further in Chapter 7 have an approximate range of $1 billion in the Base Case portfolios to $9 billion in the No New Gas portfolio. The incremental transmission cost estimates are high level projections and could vary greatly depending on factors such as the precise location of resource additions, specific resource supply and demand characteristics, the amount of new resources being connected at each location, interconnection dependencies, escalation in labor and material costs, changes in interest rates and, potential siting and permitting delays beyond the Company's control. These also do not include the costs of infrastructure upgrades that would be needed on affected third party transmission systems, e.g., other utilities and regional transmission organizations.

With respect to the distribution grid, the Company is working to develop and implement necessary changes to the distribution system to improve resiliency and to allow for dynamic power flows associated with evolving customer trends such as increased penetration of rooftop solar, electric vehicle charging, home battery systems and other innovative customer programs and rate designs. Distribution grid control enhancement investments are foundational across the scenarios in this IRP, improving flexibility to accommodate increasing levels of distribution connected renewable resources while developing a more sustainable and efficient grid. In recognition of the critical role of the transmission and distribution system in an evolving energy landscape, the Company believes it will be critical to modernize the grid as outlined in Chapter 16 and to further develop its Integrated System & Operations Planning (ISOP) framework described in Chapter 15. The Company will use ISOP tools to identify and prioritize future grid investment opportunities that can combine benefits of advanced controls with innovative rate designs and customer programs to minimize total costs across distribution, transmission, and generation.

## TECHNOLOGY, POLICY AND OPERATIONAL CONSIDERATIONS

As depicted further below, portfolios that seek quicker paces of carbon reductions have greater dependency on technology development, such as battery storage, small modular reactors and offshore



Snider DEP Exhibit 2

wind generation, which are at varying levels of maturity and commercial availability[8]. As a result, these portfolios will have a greater dependence on technology advancements and projected future cost reductions, thus requiring near-term supportive energy policies at the state or Federal levels. For example, future policy may serve to lower the cost of these emerging technologies to consumers through research and development funding or by providing direct tax incentives to these technologies.

As noted above, all portfolios will require additional grid investments in the transmission and distribution systems to integrate the new resources outlined in each of the portfolios. The portfolio analysis includes estimates of system costs, associated average residential monthly bill impact and operational and executional challenges for each portfolio. When considering these portfolios across both utilities, a combined look is presented below, followed by a DEP only view.

The "Dependency on Technology & Policy Advancement" row in the portfolio results table below reflects a qualitative assessment for each respective portfolio. More shading within a circle indicates a higher degree of dependence on future development of the respective technologies, supporting policy and operational protocols. The Base without Carbon Policy case reflects the current state, with little to no dependence on further technology advancements, policy development, and minimal operational risks. Working from left to right across the table, all other portfolios, including the Base with Carbon Policy case requires policy changes relative to the current state. The 70% $CO_2$ Reduction High Wind case would require supportive policies for expeditious onshore and offshore wind development and associated, necessary transmission build by 2030. The 70% $CO_2$ Reduction High SMR case was included to illustrate the importance of support for advancing these technologies as part of a balanced plan to achieve net-zero carbon. The No New Gas case includes dependence on all factors listed, as well as a much greater dependence on siting, permitting, interconnection and supply chain for battery storage. For the 70% reduction and No New Gas cases, the unprecedented levels of storage that are required to support significantly higher levels of variable energy resources present increased system risks, given that there is no utility experience for winter peaking utilities in the U.S. or abroad with operational protocols to manage this scale of dependence on short-term energy storage.

[8] Source: Browning, Morgan S., Lenox, Carol S. "Contribution of offshore wind to the power grid: U.S. air quality. implications." *ScienceDirect,* 2020, https://www.sciencedirect.com/science/article/abs/pii/S0306261920309867.

DUKE ENERGY PROGRESS

# DEP / DEC COMBINED SYSTEM PORTFOLIO RESULTS TABLE

| | Base without Carbon Policy | Base with Carbon Policy | Earliest Practicable Coal Retirements | 70% $CO_2$ Reduction: High Wind | 70% $CO_2$ Reduction: High SMR | No New Gas Generation |
|---|---|---|---|---|---|---|
| PORTFOLIO | A | B | C | D | E | F |
| System $CO_2$ Reduction (2030 \| 2035)[1] | 56% \| 53% | 59% \| 62% | 64% \| 64% | 70% \| 73% | 71% \| 74% | 65% \| 73% |
| Present Value Revenue Requirement (PVRR) [$B][2] | $79.8 | $82.5 | $84.1 | $100.5 | $95.5 | $108.1 |
| Estimated Transmission Investment Required [$B][3] | $0.9 | $1.8 | $1.3 | $7.5 | $3.1 | $8.9 |
| Total Solar [MW][4, 5] by 2035 | 8,650 | 12,300 | 12,400 | 16,250 | 16,250 | 16,400 |
| Incremental Onshore Wind [MW][4] by 2035 | 0 | 750 | 1,350 | 2,850 | 2,850 | 3,150 |
| Incremental Offshore Wind [MW][4] by 2035 | 0 | 0 | 0 | 2,650 | 250 | 2,650 |
| Incremental SMR Capacity [MW][4] by 2035 | 0 | 0 | 0 | 0 | 1,350 | 700 |
| Incremental Storage [MW][4, 6] by 2035 | 1,050 | 2,200 | 2,200 | 4,400 | 4,400 | 7,400 |
| Incremental Gas [MW][4] by 2035 | 9,600 | 7,350 | 9,600 | 6,400 | 6,100 | 0 |
| Total Contribution from Energy Efficiency and Demand Response Initiatives [MW][7] by 2035 | 2,050 | 2,050 | 2,050 | 3,350 | 3,350 | 3,350 |
| Remaining Dual Fuel Coal Capacity [MW][4, 8] by 2035 | 3,050 | 3,050 | 0 | 0 | 0 | 2,200 |
| Coal Retirements | Most Economic | Most Economic | Earliest Practicable | Earliest Practicable[9] | Earliest Practicable[9] | Most Economic[10] |
| Dependency on Technology & Policy Advancement | ○ | ◔ | ◑ | ◕ | ● | ● |

[1]Combined DEC/DEP System $CO_2$ Reductions from 2005 baseline
[2]PVRRs exclude the cost of $CO_2$ as tax. Including $CO_2$ costs as tax would increase PVRRs by ~$11-$16B. The PVRRs were presented through 2050 to fairly evaluate the capital cost impact associated with differing service lives
[3]Represents an estimated nominal transmission investment; cost is included in PVRR calculation
[4]All capacities are Total/Incremental nameplate capacity within the IRP planning horizon
[5]Total solar nameplate capacity includes 3,925 MW connected in DEC and DEP combined as of year-end 2020 (projected)
[6]Includes 4-hr and 6-hr grid-tied storage, storage at solar plus storage sites, and pumped storage hydro
[7]Contribution of EE/DR (including Integrated Volt-Var Control (IVVC) and Distribution System Demand Response (DSDR)) in 2035 to peak winter planning hour
[8]Remaining coal units are capable of co-firing on natural gas, **all coal units that rely exclusively on coal are retired before 2030**
[9]Earliest Practicable retirement dates with delaying one (1) Belews Creek unit and Roxboro 1&2 to EOY 2029 for integration of offshore wind/SMR by 2030
[10]Most Economic retirement dates with delaying Roxboro 1&2 to EOY 2029 for integration of offshore wind by 2030

**LEGEND:**
- ● Completely dependent
- ◕ Mostly dependent
- ◑ Moderately dependent
- ◔ Slightly dependent
- ○ Not dependent

DUKE ENERGY PROGRESS

# DEP PORTFOLIO RESULTS TABLE

| | Base without Carbon Policy | Base with Carbon Policy | Earliest Practicable Coal Retirements | 70% $CO_2$ Reduction: High Wind | 70% $CO_2$ Reduction: High SMR | No New Gas Generation |
|---|---|---|---|---|---|---|
| PORTFOLIO | A | B | C | D | E | F |
| System $CO_2$ Reduction (2030 \| 2035)[1] | 56% \| 53% | 59% \| 62% | 64% \| 64% | 70% \| 73% | 71% \| 74% | 65% \| 73% |
| Average Monthly Residential Bill Impact for a Household Using 1000kWh (by 2030 \| by 2035)[2] | $13 \| $21 | $15 \| $27 | $16 \| $24 | $31 \| $39 | $27 \| $36 | $49 \| $58 |
| Average Annual Percentage Change in Residential Bills (through 2030 \| through 2035)[2] | 1.2% \| 1.2% | 1.3% \| 1.5% | 1.4% \| 1.4% | 2.7% \| 2.1% | 2.4% \| 1.9% | 4.0% \| 2.9% |
| Present Value Revenue Requirement (PVRR) [$B][3] | $35.4 | $35.7 | $37.3 | $44.5 | $41.9 | $52.1 |
| Estimated Transmission Investment Required [$B][4] | $0.4 | $0.8 | $0.7 | $3.2 | $1.0 | $6.2 |
| Total Solar [MW][5, 6] by 2035 | 4,950 | 6,350 | 6,450 | 7,800 | 7,800 | 7,950 |
| Incremental Onshore Wind [MW][5] by 2035 | 0 | 600 | 1,350 | 1,750 | 1,750 | 1,750 |
| Incremental Offshore Wind [MW][5] by 2035 | 0 | 0 | 0 | 1,300 | 100 | 2,500 |
| Incremental SMR Capacity [MW][5] by 2035 | 0 | 0 | 0 | 0 | 700 | 0 |
| Incremental Storage [MW][5, 7] by 2035 | 700 | 1,600 | 1,600 | 2,000 | 2,000 | 5,000 |
| Incremental Gas [MW][5] by 2035 | 5,350 | 4,300 | 3,950 | 2,150 | 2,150 | 0 |
| Total Contribution from Energy Efficiency and Demand Response Initiatives [MW][8] by 2035 | 825 | 825 | 825 | 1,500 | 1,500 | 1,500 |
| Remaining Coal Capacity [MW][5] by 2035 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coal Retirements | Most Economic | Most Economic | Earliest Practicable | Earliest Practicable[9] | Earliest Practicable[9] | Most Economic[10] |
| Dependency on Technology & Policy Advancement | | | | | | |

[1]Combined DEC/DEP System $CO_2$ Reductions from 2005 baseline
[2]Represents specific IRP portfolio's incremental costs included in IRP analysis; does not include complete costs for other initiatives that are constant throughout the IRP or that may be pending before state commissions
[3]PVRRs exclude the cost of $CO_2$ as tax. Including $CO_2$ costs as tax would increase PVRRs by ~$5-$8B. The PVRRs were presented through 2050 to fairly evaluate the capital cost impact associated with differing service lives
[4]Represents an estimated nominal transmission investment; cost is included in PVRR calculation
[5]All capacities are Total/Incremental nameplate capacity within the IRP planning horizon
[6]Total solar nameplate capacity includes 2,950 MW connected in DEP as of year-end 2020 (projected)
[7]Includes 4-hr and 6-hr grid-tied storage and storage at solar plus storage sites
[8]Contribution of EE/DR (including Integrated Volt-Var Control (IVVC) and Distribution System Demand Response (DSDR)) in 2035 to peak winter planning hour
[9]Earliest Practicable retirement dates with delaying Roxboro 1&2 to EOY 2029 for integration of offshore wind/SMR by 2030
[10]Most Economic retirement dates with delaying Roxboro 1&2 to EOY 2029 for integration of offshore wind by 2030

LEGEND:
- Completely dependent
- Mostly dependent
- Moderately dependent
- Slightly dependent
- Not dependent

## CUSTOMER FINANCIAL IMPACTS

The Company is committed to the provision of affordable electricity for the residents, businesses, industries and communities served by DEP across its Carolinas' footprint. For each of the six portfolios analyzed, the IRP shows a high level projected present value of long-term revenue requirements and an average residential monthly bill impact across the Company's combined North and South Carolina service territory. Portfolios that have earlier and more aggressive adoption of technologies that are at earlier stages of development in the U.S., such as offshore wind or SMR generators, demonstrate or produce incrementally larger costs (revenue requirements) and bill impacts, but achieve carbon reductions at a more aggressive pace. While the IRP forecasts potential incremental system revenue requirement and system residential bill impact differences associated with each of the various scenarios analyzed in the IRP, it is recognized that these forecasts will change over time with evolving market conditions and policy mandates. Seeking the appropriate pace of technology adoption to achieve carbon reduction objectives requires balancing affordability while maintaining a reliable energy supply. The Company is actively engaged in soliciting stakeholder input into the planning process and is participating in the policy conversation to strike the proper balance in achieving progressive carbon reduction goals that align with customer expectations while also maintaining affordable and reliable service. Finally, cost and bill impacts presented are associated with incremental resource retirements, additions, and demand-side activities identified in the IRP and as such do not include potential efficiencies or costs in other parts of the business. Factors such as changing cost of capital, and changes in other costs will also influence future energy costs and will be incorporated in future IRP forecasts as market conditions evolve. Finally, future cost of service allocators and rate design will impact how these costs are spread among the customer classes and, therefore, customer bill impacts.

## BASE CASES

The IRP reflects two base cases, each developed with a different assumption on carbon policy. The first case assumes no carbon policy, which is the current state today. Alternatively, the second base case assumes a policy that effectively puts a price on carbon emissions from power generation, with pricing generally in line with various past or current legislative initiatives, to incentivize lower carbon resource selection and dispatch decisions needed to support a trajectory to net-zero $CO_2$ emissions by 2050. Given the uncertainties associated with how a carbon policy may be designed, the 2020 IRP carbon policy includes a cost adder on carbon emissions in resource selection as well as daily operations, effectively a "shadow price" on $CO_2$ emissions. This "shadow price" is a generic proxy that could represent the effects of a carbon tax, price of emissions allowances, or a price signal needed to meet a given clean energy standard. Given the uncertainty of the ultimate form of policy, the cost and rate impacts shown only reflect the cost of the resources that would be required to achieve carbon reduction and not the "shadow price" itself. Customers could bear an additional cost if carbon policy takes the form of a carbon tax.

In accordance with regulatory requirements of both North Carolina and South Carolina, the base cases apply least cost planning principles when determining the optimal mix of resources to meet customer demand. It should be noted that even the Base Case without Carbon Policy includes results that more than double the amount of solar connected to the DEP and DEC system today. In addition, the Base Case without Carbon Policy includes approximately 1,000 MW of battery storage across the two utilities, which is slightly above the total amount in operation in the U.S. today (source: EIA[9]). The inclusion of a price on carbon emissions drives outcomes that include higher integration of solar, wind, and storage resources when compared to the case that excludes a carbon price. Both pathways utilize the most economic coal retirement date assumption, rather than relying on the depreciable lives of the coal assets as was the case in previous IRPs.

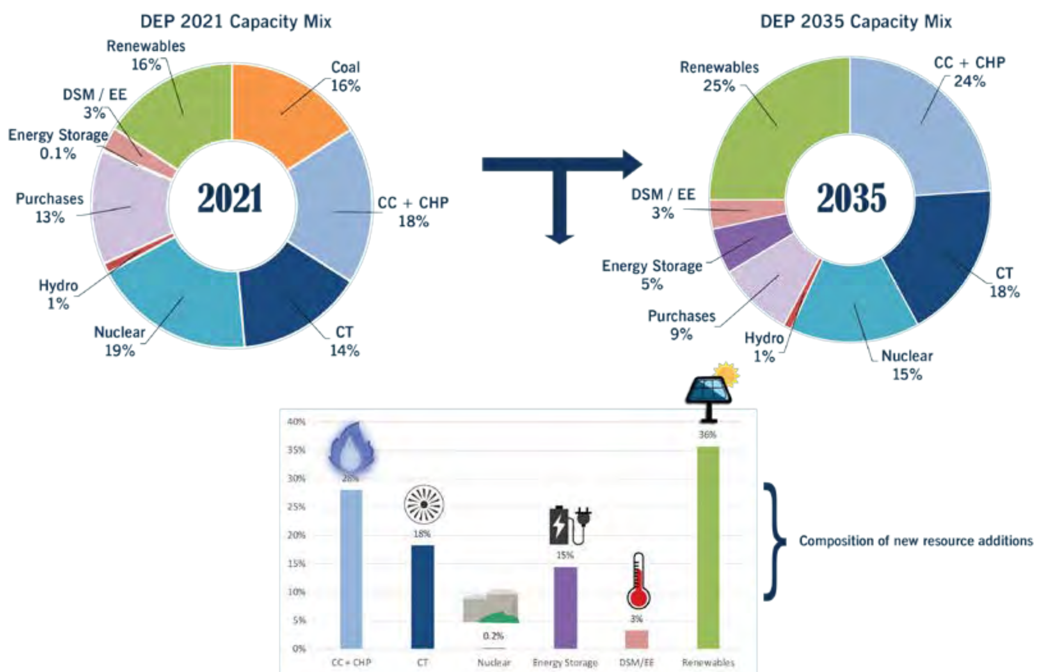
In the Company's base cases, across DEP and DEC combined, all units that operate exclusively on coal would be retired by 2030. The only remaining units that would continue to operate would be dual-fuel units with operation primarily on lower carbon natural gas. By 2035, 7,000 MW of coal-units representing 17% of nameplate capacity across the DEP and DEC system would retire, with the only remaining dual-fuel units of Cliffside 6 and Belews Creek 1 &2 operating through the remainder of their economic lives primarily on lower carbon natural gas. Under these base cases, DEP retires all 3,200 MW of coal capacity by 2030 and DEC retires approximately 3,800 MW of coal capacity by 2035. The remaining units can continue to provide valuable generation capacity to meet peak demand, with generation making up approximately less than 5% of the energy served by DEC and DEP combined by 2035.

The Company's investment to allow for use of lower carbon natural gas at certain coal sites provides a benefit to customers by optimizing existing infrastructure. This dual-fuel capability also improves operational flexibility to accommodate renewables by lowering minimum loads and improving ramp rates while also reducing carbon emissions over the remaining life of the assets. These base case

[9] https://www.eia.gov/analysis/studies/electricity/batterystorage/pdf/battery_storage.pdf.

portfolios serve as the benchmark for comparing the incremental costs and benefits of alternative more aggressive carbon reduction scenarios. The figure below illustrates how DEP's capacity mix changes over the 2021 through the 2035 period in the Base Case with Carbon Policy. The bar chart at the bottom illustrates the makeup of the incremental resources added over that timeframe. For example, renewables make up 36% of the incremental resources added between 2021 and 2035, raising the proportion of renewables in the overall fleet to 25% by 2035.

### CHANGE IN INSTALLED CAPACITY[10]




## EARLIEST PRACTICABLE COAL RETIREMENTS

For comparison purposes, the Earliest Practicable Retirement case suspends traditional "least cost" economic planning considerations and evaluates the physical feasibility of retiring all the Company's 10,000 MW of coal generation sites within DEP and DEC as early as practicable when taking into consideration the timing required to put replacement resources and supporting infrastructure into service. Aggressive levels of new solar, wind and battery storage were also utilized in this portfolio to accelerate the retirement of a portion of existing coal generation while also reducing the need for

[10] Change in capacity from the Base Case with Carbon Policy portfolio.

incremental gas infrastructure. In determining the "earliest practicable" coal retirement dates, this case considers the siting, permitting, regulatory approval and construction timeline for replacement resources as well as supporting infrastructure such as new transmission and new gas transportation infrastructure. This case assumes the majority of dispatchable resources are replaced at the coal retiring facilities to minimize the resources needed and time associated with additional land acquisition as well as transmission and gas infrastructure that would be required. This approach enables a more rapid transition from coal to lower carbon technologies while maintaining appropriate planning reserves for reliability.

Under this portfolio, all coal units in DEP and DEC would be retired by 2030 with the exception of DEC's Cliffside 6 unit, which would take advantage of its current dual fuel capability and switch to 100% natural gas by 2030. In the aggregate across DEP and DEC, this portfolio includes a diverse mix of over 20,000 MW of new resources being placed in service. This diverse mix results in a combined system carbon reduction of 64% by 2030 while mitigating overall costs and bill impacts by leveraging existing infrastructure associated with the current coal fleet. Finally, while "practicable" from a technical perspective, the sheer magnitude, pace and array of technologies included in this portfolio with approximately half coming from renewable wind and solar resources and half from dispatchable gas, make it evident that new supportive energy policy and regulations would be required to effectuate such a rapid transition.

## 70% GHG REDUCTION CASES

This IRP also details two cases to achieve a more aggressive carbon reduction goal, such as the goal to achieve 70% greenhouse gas emission reductions from the electric sector by 2030, which is under evaluation in the development of the North Carolina Clean Energy Plan. Achieving these targets will require the addition of diverse, new types of carbon-free resources as well as additional energy storage to replace the significant level of energy and capacity currently supplied by coal units. To support this pace of carbon reduction, this case assumes the same coal unit retirement dates as the "earliest practicable" case, with the exception of shifting the retirement date of one of the Belews Creek units and Roxboro 1&2 units to the end of 2029 to allow for the integration of new carbon free resources by 2030. The resource portfolios in the 70% $CO_2$ reduction scenarios reflect an accelerated utilization of technologies that are yet to be commercially demonstrated at scale in the United States and may be challenging to bring into service by the 2030 timeframe.



**Snider DEP Exhibit 2**

For the purposes of this IRP, the Company evaluated the emerging carbon free technologies that are furthest along the development and deployment curves – Carolinas offshore wind and small modular nuclear reactors. Adding this level of new carbon free resources prior to 2030 will require the adoption of supportive state policies in both North Carolina and South Carolina. It will also require extensive additional analysis around the siting, permitting, interconnection, system upgrades, supply chain and operational considerations of more significant amounts of intermittent resources and much greater dependence on energy storage on the system. The High SMR case also assumes that SMRs are in service by 2030. However, the challenges with integrating a first of a kind technology in a relatively compressed timeframe are significant. Therefore, these cases are intended to illustrate the importance of advancing such technologies as part of a blended approach that considers a range of carbon-free technologies to allow deeper carbon reductions. When comparing and contrasting the two portfolios, differences in resource characteristics, projected future views on technology costs, associated transmission infrastructure requirements and dependencies on federal regulations and legislation all influence the pace and resource mix that is ultimately adopted in the Carolinas. An examination of two alternate portfolios that achieve 70% carbon reduction by 2030 highlight some of these key considerations for stakeholders. As discussed in Chapter 16, the Company is actively promoting the further development of future carbon free technologies which are a prerequisite to a net-zero future.

## NO NEW GAS GENERATION

In response to stakeholder interest in a No New Gas case, the Company evaluated the characteristics of an energy system that excludes the addition of new gas generating units from the future portfolio. Recognizing the challenges of replacing coal energy and capacity with only carbon-free resources, this scenario does not accelerate coal retirements but rather assumes the most economic coal retirement dates reflected in the base case with the exception of Roxboro 1&2 which are delayed to the end of 2029 to allow for integration of offshore wind by 2030. Similar to the 70% $CO_2$ reduction cases, this resource portfolio is highly dependent upon the development of diverse, new carbon-free sources and even larger additions of energy storage and offshore wind as well as the adoption of supportive policies at the state and federal level. Also similar to the 70% case, the No New Gas case would require additional analysis around the siting, permitting, interconnection, system upgrades, supply chain integration and operational considerations of bringing on significant amounts of intermittent resources onto the system. Notably, the heavier reliance on large-scale battery energy storage in this scenario would require significant additional analysis and study since this technology is emergent with very limited history and limited scale of deployment on power grids worldwide. To provide a sense of scale,



Snider DEP Exhibit 2

at the combined system level it would require approximately 1,100 acres of land, or more than 830 football fields to support the amount of batteries in this portfolio and would represent over six times the amount of large-scale battery storage currently in service in the United States. The lack of meaningful industry experience with battery storage resources at this scale presents significant operational considerations that would need to be resolved prior to deployment at such a large scale, which is addressed further in Chapter 16.

Finally, in the combined DEP and DEC view, the No New Gas case is estimated to have the highest customer cost impacts primarily due to the magnitude of early adoption of emerging carbon free technologies and the significant energy storage and transmission investments required to support those technologies. As is the case with almost all technologies, improvements in performance and reductions in cost are projected to occur over time. Without the deployment of new efficient natural gas resources as one component of a long-term decarbonization strategy, the system must run existing coal units longer to allow emerging technologies to evolve from both a technological and an economic perspective. In the alternative, the acceleration of coal retirements without some consideration of new efficient natural gas as a transition resource forces the large-scale adoption of such technologies before they have a chance to mature and decline in price, resulting in higher costs and operational risks for consumers. The summary table highlights the fact that this scenario is dependent on significant technological advances and new policy initiatives that would seek to recognize and address these considerations prior to implementation.

## KEY ASSUMPTIONS

The following table provides an overview of the key assumptions applied to our modeling and analysis with comparisons to 2019 IRP. In addition, the company runs a number of sensitivities, such as high and low load growth, energy efficiency and renewable integration levels that demonstrate the impact of changes in various assumptions.

## KEY ASSUMPTIONS TABLE

| TOPIC AREA | 2019 IRP | 2020 IRP | NOTES |
|---|---|---|---|
| Load Forecast | **DEP:** 0.9% Winter Peak Demand CAGR **DEC:** 0.8% Winter Peak Demand CAGR | **DEP:** 0.9% Winter Peak Demand CAGR **DEC:** 0.6% Winter Peak Demand CAGR | Lower load growth due to economic factors and refinements of historical load data. |
| Reserve Margin | 17% | 17% | New LOLE Study reaffirms 17% strikes the appropriate balance between cost and reliability |
| Solar (Single Axis Tracking) | 37% cost decline through 2030 | 42% cost decline through 2030 | 7% lower year one cost compared to 2019 IRP |
| 4-hour Battery Storage | 54% cost decline through 2030 | 49% cost decline through 2030 | 32% lower year one cost compared to 2019 IRP |
| Onshore Wind | 12% cost decline through 2030 | 11% cost decline through 2030 | 7% lower year one cost compared to 2019 IRP; For the first time, wind allowed to be economically selected in planning process |
| Offshore Wind | N/A | 40% cost decline through 2030 | For the first time, offshore wind is considered in the planning horizon |
| Natural Gas | 17% cost decline through 2030 | 17% cost decline through 2030 | No Material Change |
| Coal | Retired based on depreciable lives at the time of the IRP | Retired based on analysis for most economic and earliest practicable retirement dates | Scenarios consider earliest practicable and most economic |
| New Nuclear | SMRs discussed but not screened for selection | SMRs included for selection | For the first time, SMRs available to be economically selected as a resource |

## EXECUTIVE SUMMARY CONCLUSION

DEP remains focused on transitioning to a cleaner energy future, advancing climate goals that are important to its customers and stakeholders, while continuing to deliver affordable and reliable service. The 2020 IRP reflects multiple potential future pathways towards these goals. An analysis of each case reflects the associated benefits and costs with each portfolio as well as challenges that would need to be addressed with more aggressive carbon reduction scenarios. This range of portfolios helps illustrate the benefits of a diverse resource mix to assure the reliability of the system and efficiently support the transition toward a carbon-free resource mix. Public policies and the advancement of new, innovative technologies will ultimately shape the pace of the ongoing energy transformation. Duke Energy looks forward to continued engagement and collaboration with stakeholders to chart a path forward that balances affordability, reliability and sustainability.

# Duke Energy 2020 Integrated Resource Planning (IRP) Stakeholder Engagement Summary Report

## 1. Executive Summary

This report provides an overview of the stakeholder engagement activities undertaken by Duke Energy (Duke) to support development of the 2020 IRPs for Duke Energy Progress (DEP) and Duke Energy Carolinas (DEC). Duke organized these activities for its North Carolina and South Carolina stakeholders with the objectives of educating participants on the IRP regulatory requirements and development process, soliciting upfront input to inform the foundational inputs to the 2020 IRP and to simplify the post-filing adjudicated process.

**These engagement activities, which spanned six distinct efforts/events and included North Carolina and South Carolina stakeholders, are described in greater detail later in the report:**

1. Community-level IRP listening sessions in North Carolina and South Carolina to solicit stakeholder input about priority IRP focus areas and suggestions for how to structure later engagement activities (January to April 2020).
2. Duke and ICF co-facilitated an IRP 101 webinar to provide stakeholders with an overview of national trends, existing North Carolina and South Carolina regulatory requirements, and current Duke practices (March 2020).
3. A pre-engagement survey, conducted by ICF prior to two virtual stakeholder forums, to solicit input on priority focus areas and suggestions for how to structure forthcoming IRP engagement activities (March 2020).
4. An initial IRP virtual forum with focus areas based on stakeholder-indicated priorities from the ICF survey, designed to allow ample engagement by stakeholders through moderated Q&A (March 2020).
5. A second IRP virtual forum that largely covered the same focus areas as the first forum, but advanced the conversation by providing new types of information sought after by stakeholders and allowed for greater dialogue between stakeholders and Duke (April 2020).
6. A pre-filing webinar to review various comments and questions from stakeholders and to provide an overview of how Duke decided which input to incorporate into this year's IRPs (June 2020).

Additionally, Duke created a web site, www.duke-energy.com/irp, to provide stakeholders with access to materials from these IRP sessions and related reference materials, including all of the presentation materials from the webinars and virtual forums, and a document capturing Q&As raised by participants during these sessions. Duke also followed up directly with stakeholders whose questions were not able to be addressed during the allotted timeframes of each session.

These engagement activities allowed Duke to solicit valuable input from stakeholders and ensure the process was informative for stakeholders. For example, while ICF's pre-engagement survey highlighted that less than half of respondents were familiar with Duke's IRP modeling process, a survey following the last webinar demonstrated that stakeholders had enhanced their understanding of Duke's IRP process throughout these engagement efforts (i.e. an average score of 7.8 out of 10). The feedback received during these stakeholder engagement activities allowed Duke to more effectively design subsequent engagement activities around stakeholder priority areas and actively explore opportunities to reflect stakeholder input in the development of the 2020 IRP, all with the goal of simplifying the post-filing adjudicated process.

**Stakeholder feedback generally converged on five key areas: (1) resource evaluation; (2) carbon reduction in the IRP; (3) energy efficiency (EE) and demand response (DR); (4) transparency of the IRP process; and (5) opportunities for stakeholder participation.**

- **Resource Evaluation:** Stakeholder feedback in this area centered on how Duke models different resources to meet system needs and which data inputs, methodological assumptions and outputs it uses as part of the IRP. Stakeholders expressed interest in further understanding how Duke is evaluating the long-term role of existing supply resources, including nuclear, gas, and coal, and how it would expand efforts to incorporate newer resources, such as solar, storage, and wind. Some stakeholders expressed support for Duke's transition to the EnCompass modeling tool, which they indicated will help create improved functionality and greater transparency for modeling non-traditional resources to meet system needs. Additionally, stakeholders provided Duke with suggestions on specific datasets to use as inputs for the IRP modeling and the types of outputs that would be most valuable.
- **Carbon reduction in the IRP:** This focus area includes the pathways Duke could take to achieve carbon reduction goals, including fossil fuel power plant retirements and clean energy modeling. Some of the key areas of alignment in stakeholder feedback for this area include ensuring Duke explicitly states how the 2020 IRP differs from prior IRPs given the company's new climate goal, understanding how Duke reconciles differences in the time horizons for its IRP and climate goals, and identifying potential rate impacts associated with various carbon reduction pathways. Stakeholders also expressed interest in learning more about the role expanded transmission would play (e.g., to transmit electricity generated by offshore wind) and how Duke considers fugitive emissions as part of the modeling process. Stakeholders noted overlap between this topic and resource evaluation given the importance of identifying clean energy resources to replace retired coal assets and decrease the reliance on natural gas resources.
- **EE and DR:** Stakeholders expressed support for expanding opportunities for EE and DR (or demand-side management, or DSM, more broadly) to contribute to meeting system peaking needs. Given increasing winter peaking system needs, stakeholders suggested that DSM could play an important role in meeting those needs and should therefore be analyzed alongside other supply resources. In response, Duke proposed to conduct a winter peak reduction study to further evaluate the potential for innovative program designs and rate designs to help address

these needs, particularly in future IRPs. Stakeholders indicated strong support for undertaking this study and reinforced support for the development of innovative rate designs (e.g., time-of-use rates) to more accurately reflect the varying nature of system costs. One key area of emphasis from stakeholders was that all these contemplated options should ensure low- and moderate-income customers have opportunities to participate.

- **Transparency of the IRP process:** Related to the first three areas, stakeholders emphasized the importance of improving transparency of the IRP process. Given the technical rigor of the IRP modeling, stakeholders expressed an interest in having greater insights into the inputs and key methodological assumptions Duke uses as part of the process. Stakeholders also provided feedback on the types of outputs that would be most valuable, which can help streamline the post-filing data request process.
- **Opportunities for stakeholder engagement:** Stakeholders commended Duke for creating multiple opportunities and avenues for stakeholders to engage proactively on the 2020 IRP. Stakeholders appreciated Duke's efforts to design engagement sessions that allowed for informative two-way dialogue and supported the use of an independent facilitator to moderate the discussions. Additionally, stakeholders found it helpful for Duke to clearly articulate areas of feedback it sought from stakeholders and appreciated the opportunity to provide additional input to Duke outside of the engagement sessions themselves.

Following each of the virtual forums, ICF administered a survey of participants to solicit input on areas of interest and suggestions for future engagement activities. In total, 52 participants responded to the two surveys – 13 for the first forum and 39 for the second forum. Table 1 provides a summary of the average scores based on participants' responses to each of the questions (each forum had five rating-scale questions). Additionally, participants expressed appreciation for the opportunity to engage in dialogue with Duke and suggested a continued focus on the five areas mentioned above.

*Table 1: Summary of Virtual Forum Survey Responses to Rating-Scale Questions*

| Survey Question | First forum average score (scale of 0-10) | Second forum average score (scale of 0-10) |
|---|---|---|
| **How helpful was this forum in enhancing your understanding of Duke Energy's Integrated Resource Plan process?** (0 = not at all helpful, 10 = extremely helpful) | 7.4 | 7.6 |
| **How satisfied are you with the opportunity to provide feedback to and engage in dialogue with Duke Energy?** (0 = not at all satisfied, 10 = extremely satisfied) | 7.2 | 7.1 |
| **How helpful was this workshop in enhancing your understanding about other stakeholders' point of view?** (0 = not at all helpful, 10 = extremely helpful) | 5.5 | 6.7 |

| Survey Question | First forum average score (scale of 0-10) | Second forum average score (scale of 0-10) |
|---|---|---|
| **How willing are you to engage in follow-up conversations with Duke Energy around the IRP initiative?** (0 = not at all willing, 10 = extremely willing) | 9.5 | N/A |
| **How effective was this workshop in providing a foundation for new kinds of conversation and collaboration going forward?** (0 = not at all effective, 10 = extremely effective) | 6.9 | 6.8 |
| **How likely are you to provide Duke Energy with additional feedback before the May 1st deadline?** (0 = not likely at all, 10 = extremely likely) | N/A | 7.2 |

In addition to the surveys, 18 entities provided feedback on the following topics that Duke specifically requested input on during the second forum:

- **Resource Evaluation:** Additional data sources or evaluation methodologies to be considered
- **Carbon Reduction:** Additional scenarios and sensitivities and technology assumptions
- **Energy Efficiency/Demand Response:** Potential for Duke to undertake a winter peak demand reduction analysis

As the final planned stakeholder engagement session prior to the filing of the 2020 IRP, Duke hosted a webinar on June 18 to share the feedback stakeholders submitted that had generated the most stakeholder support and interest and address the company's ability to incorporate this feedback into the 2020 IRP. Following the webinar, 23 stakeholders completed a survey and expressed strong support and appreciation for Duke's IRP engagement process. Table 2 provides a summary of the average scores based on participants' responses to each of the five rating-scale questions.

*Table 2: Summary of Final Planned Webinar Survey Responses to Rating-Scale Questions*

| Survey Question | Average score (scale of 0-10) |
|---|---|
| **How helpful was this forum in enhancing your understanding of Duke Energy's Integrated Resource Plan process?** (0 = not at all helpful, 10 = extremely helpful) | 7.8 |
| **How satisfied have you been with the opportunity to provide feedback to and engage in dialogue with Duke Energy?** (0 = not at all satisfied, 10 = extremely satisfied) | 7.4 |

| Survey Question | Average score (scale of 0-10) |
|---|---|
| **Do you feel the key themes of today's webinar were reflective of stakeholder feedback? (0 = not at all reflective, 10 = extremely reflective)** | 7.6 |
| **How effective have these stakeholder engagement efforts been for you? (0 = not at all effective, 10 = extremely effective)** | 7.5 |
| **How likely would you be to engage in future IRP discussions? (0 = not likely at all, 10 = extremely likely)** | 9.0 |

Duke's six stakeholder engagement efforts/events—plus an additional opportunity for stakeholders to provide feedback on specific high-priority areas Duke identified—allowed Duke to amass a significant amount of stakeholder input aimed at further improving the 2020 IRP. While the feedback covered an array of topics, it generally aligned with one of three focus areas: (1) resource evaluation, (2) carbon reduction, or (3) energy efficiency, demand response, and winter peaking study. Duke provided guidance during its final pre-IRP filing stakeholder webinar on June 18 on how it is responding to this stakeholder feedback (Table 3).

*Table 3: Summary of Duke Actions in Response to Stakeholder Feedback*

| Stakeholder Feedback: Areas with Most Stakeholder Support and/or Interest | Duke Action Taken |
|---|---|
| **Resource Evaluation** | |
| Desire by some for earlier insight on key data inputs and methodological assumptions | • Expedited response for intervenors under a non-disclosure agreement (NDA)<br>• Duke moved up the timing of a Duke-hosted technical review with stakeholders from November to September |
| Consideration should be given to additional data sources | • Duke will use the EIA's 2020 Annual Energy Outlook (AEO) high and low oil and gas supply natural gas price curves as a benchmark to develop price curves<br>• Vendor-supplied data uses market-based project data and Duke will benchmark with public sources to determine reasonableness |
| Duke should utilize EnCompass for the 2020 IRP and describe more about the integration of Duke's Integrated System & Operations Planning (ISOP) effort | • Duke will transition to EnCompass model in 2021 given delays in required training and implementation due to COVID response<br>• The 2020 IRP will provide an update on ISOP and the 2022 IRP will reflect basic ISOP elements by assessing opportunities to defer or avoid traditional investments with non-traditional solutions |

| Stakeholder Feedback: Areas with Most Stakeholder Support and/or Interest | Duke Action Taken |
|---|---|
| Further clarity sought on coal retirement analysis | • Duke is conducting a transparent, detailed analysis of each remaining unit<br>• Duke is conducting analysis that considers the most economic retirement pathway and earliest practicable retirement pathway |
| Interest in learning more about the potential for competitive solicitations | • Duke actively supports competitive procurement of renewables, which was part of comprehensive, collaborative legislation (HB 589)<br>• When selecting resources to replace retiring coal units, Duke will consider alternative resources through a competitive procurement process<br>• Duke envisions alternate technologies bidding into future RFPs |
| Duke should explain what the customer bill impacts are of various pathways forward | • IRP will present high-level system costs and average bill impacts of varying resource portfolios and carbon reduction glide paths |
| **Carbon Reduction** | |
| Diversity in carbon scenarios, with specific interest in CEP scenarios and relationship to climate goals | • IRP will rely on $CO_2$ prices to drive reductions in emissions and prices will align with previous or currently proposed carbon regulations<br>• The IRP will reflect $CO_2$ prices with two separate views<br>  ○ As a driver to commit resources to achieve a "carbon mass cap"<br>  ○ As an explicit tax that is collected through utility bills as a carbon tax<br>• Portfolios will reflect multiple glide paths to achieving Duke's 2050 net-zero carbon goals, including considerations for the Clean Energy Plan |
| Role of expanded transmission | • The Transmission Planning Collaborative is studying opportunities to bring offshore wind into DEC and DEP, and the ISOP developmental effort will also explore potential benefits of strategic transmission investments |
| Considerations & assumptions for new technologies, especially solar, storage, wind, and solar plus storage | • Forecasts will include ~50% of incremental additions as solar plus storage<br>• The model is eligible to select additional solar and solar plus storage above the forecast |
| **EE, DR, and Winter Peaking Study** | |
| Strong support for pursuing the Winter Peaking Study | • Proceeding with the study and will incorporate into the IRP's high EE/DR scenario (when available)<br>• Will continue engaging stakeholders via the EE collaborative and ISOP stakeholder sessions |

| Stakeholder Feedback: Areas with Most Stakeholder Support and/or Interest | Duke Action Taken |
|---|---|
| Study should evaluate customer programs that help address clean energy goals | • Use of 8760 hourly load shapes will help facilitate carbon impact modeling |
| Consideration needed for customer cost impacts, especially non-participants | • Will consider both participant and non-participant impacts with a focus on rate designs and innovative DER approaches that minimize program costs while driving targeted impacts |
| Study should evaluate differences between DEC and DEP | • The analysis will incorporate this distinction |
| Evaluate DEP West water heater and heat pump measures | • The study will analyze cold climate heat pumps and water heater controls |
| Study should account for winter peak length and continuation of summer peak hours | • Duke program designs will account for the length, frequency, and other characteristics of winter peak needs<br>• Since the IRP accounts for all hours of the year, many of these winter-peak solutions can also help drive summer peak savings |

Duke will consider stakeholder input in the development of the 2020 IRPs for DEC and DEP and will work with intervenors to provide access to key inputs in an expedited fashion shortly after filing. Duke also plans to hold a post-filing Technical Briefing in September and share additional details on IRP inputs as well as key takeaways from the expanded analysis in the 2020 IRPs, which will reflect alternate resource portfolios as part of a broader range of scenarios and sensitivities compared to past IRPs. Since one of the objectives of this IRP stakeholder process is to simplify the post-filing adjudicated process, Duke will assess the effectiveness of this formal stakeholder engagement effort and make adjustments as appropriate to enable greater transparency of the evaluation processes and understanding of IRP results to hopefully provide for streamlined proceedings before the NCUC and PSCSC.

# 2. Overview of Duke Energy Stakeholder Engagement Activities

## 2.1. Intervenor Comments

To help inform potential focus areas in the Duke engagement activities, ICF evaluated recent comments from relevant South Carolina and North Carolina dockets. For South Carolina, ICF reviewed from Docket 2019-224-E and 2019-225-E where intervenors filed comments related to Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP), respectively. Intervenors who submitted comments (all since January 2020) in these South Carolina PSC dockets include South Carolina Solar Business Alliance, Inc. and Johnson Development Associates, Inc. (SCSBA/JDA), Southern Environmental Law Center, South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, and Upstate Forever.

For North Carolina, ICF reviewed comments from the Commission-issued Order (August 2019) on the 2018 IRP, along with comments from a public meeting held in January 2020 where Duke, NRDC, Southern Alliance for Clean Energy, the Sierra Club, and North Carolina Public staff shared comments on IRP issues.

## 2.2. Community-Level IRP Listening Sessions

Duke hosted a total of seven community-level listening sessions – three in South Carolina and four in North Carolina – to engage a variety of stakeholder audiences (e.g., customers; environmental; renewables/DER; etc.) and solicit input on their priorities related to the 2020 IRP. Due to COVID-19, some of the earlier sessions that Duke had planned to hold in person were moved to virtual sessions.

*Table 4: Summary of Duke Community IRP Listening Sessions*

| Date | Location | Number of Participants |
|---|---|---|
| February 26, 2020 | NC | 12 |
| March 2, 2020 | SC | 4 |
| March 4, 2020 | NC | 5 |
| March 5, 2020 | NC | 7 |
| March 5, 2020 | SC | 3 |
| March 9, 2020 | SC | 2 |
| April 8, 2020 | NC | 23 |

Table 5 provides a summary of key comments and questions stakeholders raised over the course of these listening sessions. These questions helped inform the topics ICF and Duke selected to focus on during the two forums, which are further described in Sections 2.5 and 2.6.

*Table 5: Summary of Stakeholder Comments and Questions During IRP Listening Sessions*

| Category | Comments |
|---|---|
| **Resource Evaluation** | How does the modeling effort take into consideration existing resources considering that they may or may not become un-economic over time? |
| | Would small modular nuclear be considered as part of the future resource mix? |
| | How is Duke approaching nuclear relicensing? |
| | How long will the requested relicensing for Oconee last for? |
| | How is the potential impact of merchant gas development factored into the IRP? |
| | What will happen to gas resources after 2030? How does the company's carbon goal impact this? |
| | What policies and replacement resources are needed to retire coal? What role do existing resources and imports play? |
| | How does Duke model EE? How does the Market Potential Study inform the IRP? |
| | What role does Duke assume microgrids will play in meeting peaking needs? |
| | What benefits might arise if Duke combined the Carolinas into a single balancing authority? |
| | How does Duke compare rate impacts of various scenarios? |
| **IRP Basics** | What is the difference between IRP and ISOP? |
| | What is the role of IRP? |

| Category | Comments |
|---|---|
| | What is the time horizon Duke is considering in the IRP? |
| | What are the impacts of adding the transmission and distribution components to the IRP? How does this impact large customers? |
| Stakeholder Involvement | What is the Commission's involvement in ISOP? |
| | What is the involvement of the PUC in the IRP? |
| | How can stakeholders provide feedback in this process? |
| Transparency | Stakeholders identified the need for greater transparency around RECs in the IRP and suggested tying it with e-grid data. |
| | What steps is Duke taking to increase transparency in the modeling process? |
| | How can stakeholders request access to modeling documentation? |
| Clean Energy | What is Duke's vision in terms of ownership of new renewables and availability of future programs available to promote REC ownership? |
| | Duke should be explicit about how the company's climate strategy is changing the approach in the 2020 IRP relative to prior IRPs. |
| | How does the IRP incorporate Duke's net-zero by 2050 goal? What changes is Duke making if achieving this goal is inconsistent with a least-cost model? |
| | Does Duke use a carbon price when conducting its IRP? |
| | What transmission upgrades are needed to capture the potential of offshore wind? |
| | What assumption does Duke make about fugitive emission on the gas system? Does it consider other scope emissions or the carbon footprint of its supply chain? |
| Load Forecast | How does Duke determine the load forecast? How can Duke provide greater transparency into data sources and assumptions? |
| | Does Duke analyze how climate change may change heating/cooling degree day estimates? |
| | Is Duke considering vehicle electrification, including the potential for managed EV charging? |
| Input Data | How does Duke determine technology cost curves for renewables? |
| DSM | What is Duke's projected growth in EE and demand response (DR)? |
| | What opportunities do low-income customers have to participate in DSM programs? |
| Transmission | How does Duke focus on transmission reliability (e.g., how Duke locates failures)? |
| Specific Model Questions | What optimization software is Duke using for both production cost modeling and capacity expansion? |
| | Duke should consider the full value of renewables, including resilience |

## 2.3. IRP 101 Webinar

Duke and ICF co-facilitated a one-hour webinar on March 10, 2020 to provide an overview on IRP and set the stage for further engagement as part of the two forums. The webinar focused on the following components:

- What an IRP is and why it's an important tool
- Defining characteristics of an IRP
- Components and factors considered within an IRP
- IRP results and outputs
- Duke Energy IRP overview

34 stakeholders attended the webinar. Duke also posted and distributed the webinar slides and recording to all stakeholders, ensuring those who could not make the webinar had a chance to review them prior to the virtual forums.

## 2.4. ICF Survey

ICF conducted a survey of North Carolina and South Carolina Duke stakeholders prior to the March 17 forum to further solicit input to inform the structure of the two forums. The survey, which ICF sent to Duke stakeholders on March 4, included seven questions and 16 stakeholders participated. The following provides a high-level summary of survey questions and responses:

- **Q1 – How familiar are you with North and South Carolina IRP filing requirements.**
  - The majority of respondents are somewhat familiar (44%) or very familiar (31%) with the IRP filing requirements.
  - No respondent indicated they were not familiar with the IRP process.
- **Q2 – Please rank topics below in order of importance to you for discussion at the IRP forum.**
  - Participants ranked options on a scale of 1 to 5. Options included:
    - State filing requirements
    - Input data assumptions
    - Modeling methodology
    - "Big picture" scenario outlooks
    - Types of modeling outputs/results/metrics.
  - In order of importance, the top three topics (based on the total score) were (1) "big picture" scenario, (2) input data assumptions, and (3) modeling methodology. Eight respondents ranked "big picture" scenario as their top choice, while 13 ranked state filing requirements as their lowest choice.
- **Q3 – Please indicate any topics areas of interest not identified in Question 2.**
  - Most respondents focused on resource evaluation and carbon reduction metrics and goals.
  - Other topics respondents mentioned included: differences between North and South Carolina, treatment of stranded asset risk for new natural gas, use of non-wires alternatives and demand-side management (DSM), ancillary services from storage, and how to get IRP outputs for use in spreadsheets.
- **Q4 – How familiar are you with Duke's IRP modeling process?**
  - 44% of respondents are not familiar with Duke's IRP modeling process, 25% of respondents are somewhat familiar, and 19% are very familiar.
- **Q5 – Please rank data input assumption areas you would be interested in discussing.**
  - Respondents chose between seven options:
    - Commodity price forecast (e.g., natural gas prices)
    - Capital equipment cost and performance
    - Load forecast
    - Energy efficiency/demand side management

    - Environmental policy and compliance options
    - Distributed energy resources
    - Reserve requirements
  - While results were relatively evenly distributed amongst all seven options, the top three were (1) energy efficiency/demand side management, (2) distributed energy resources, and (3) environmental policy and compliance options.
- **Q6 – Please indicate if there are any additional data topics not identified in Question 5 that you would be interested in discussing.**
  - Like question 3, the topics of greatest interest for respondents were resource evaluation and carbon reduction. Respondents provided other topics, including considerations around making the Carolinas a single balancing authority, how real-time pricing could affect peak demand, and how to model other environmental costs
- **Q7 – Do you have any preferred dataset/sources you can provide? Please list sources and/or include links in the comment box.**
  - Respondents provided two studies:
    - "Natural Gas: A Bridge to Climate Breakdown." Linked here: https://energyinnovation.org/wp-content/uploads/2020/03/Natural-Gas_A-Bridge-to-Climate-Breakdown.pdf
    - Alqahtani, B. and Patiño-Echeverri, D., Combined effects of policies to increase energy efficiency and distributed solar generation: A case study of the Carolinas. Energy Policy. Volume 134, November 2019, 110936. https://doi.org/10.1016/j.enpol.2019.110936 Alqahtani, B. and Patiño-Echeverri, D., "Integrated Solar Combined Cycle Power Plants: Paving the Way for Thermal Solar" Applied Energy 2016 (169), 927–936, doi:10.1016/j.apenergy.2016.02.083

## 2.5. First IRP Forum

Duke hosted its first IRP forum on March 17, 2020 via webinar. Although initially scheduled as an in-person session in Columbia, South Carolina, Duke converted the session to be entirely virtual due to the COVID-19 pandemic. ICF facilitated the stakeholder workshop on Duke's behalf. Duke shared the agenda, slides, and recordings[1] from the session. Duke also created an IRP engagement e-mail at IRP-engagement@duke-energy.com that it shared during the forum where stakeholders could submit additional ideas and feedback. To encourage open dialogue, Duke did not record portions of the workshop that entailed verbal participation by stakeholders.

Excluding Duke and ICF staff, the stakeholder workshop featured a total of 72 attendees representing 48 entities (Table 6).

[1] There are five separate recordings, one for each agenda item covered during the forum.

*Table 6: Breakdown of Stakeholder Attendees from 3/17 Forum*

| Stakeholder Category | Total Attendees |
|---|---|
| **Academic/Research** | 7 |
| **Environmental** | 19 |
| **Government** | 14 |
| **Customers** | 12 |
| **Renewable/DER** | 10 |
| **Other** | 10 |

### 2.5.1. Overview of Forum Agenda and Breakout Sessions

Duke and ICF structured the first forum to focus on the topics that were most important to stakeholders based on feedback from listening sessions, intervenor comments filed in previous IRP dockets, and the survey sent by ICF on March 4. The forum began with an overview from ICF of the national landscape for utility IRP processes, including forecasting and planning requirements and recent national trends. Duke then provided an overview of the IRP process in the Carolinas and how that aligns with national best practices and trends. These presentations set the stage for four breakout sessions that were chosen based on stakeholders' greatest areas of interest: (1) resource evaluation; (2) carbon reduction in the IRP; (3) energy efficiency; and (4) load forecasting. Each session featured a short introduction from Duke subject-matter experts and concluded with ICF moderating a Q&A session between participants and Duke.

**Resource Evaluation**

Duke provided a short overview of the key considerations it takes when determining cost-effective resource mixes, which sources it uses for various data inputs, and key factors impacting evaluation for the 2020 IRP. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including fuel price and discount rate assumptions, analysis of ancillary services from storage, updates on Duke's renewable integration analysis with NREL, and the role of DSM resources in capacity expansion modeling.

**Carbon Reduction in the IRP**

Duke provided a short overview of how the IRP will consider Duke Energy's climate strategy and the North Carolina Department of Environmental Quality (DEQ) Clean Energy Plan, including how this builds off Duke's current process for evaluating carbon reductions and relates to its coal plant retirement analysis. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including how carbon pricing impacts decisions around coal plant retirement, whether Duke uses discrete values for carbon price assumptions, if Duke considers carbon impacts for imports, and if Duke's carbon reduction plans account for fugitive emissions from natural gas production and distribution.

**Energy Efficiency and Demand Response**

Duke started by describing the full range of existing EE and DSM programs available to its customers in the Carolinas and provided an overview of its 2020 Market Potential Study (MPS) and methodologies for forecasting EE and demand response growth. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including which programs are directed to low-income customers, how EE and DSM could be leveraged to lower the system peak, what role there may be for more dynamic pricing at the retail level, and how Duke differentiates between organic growth of EE versus that driven by the company's programs.

**Load Forecasting**

Duke opened the breakout session by reviewing its load forecasting economic assumptions, projections for weather, renewables, EE, net metering (NEM), and electric vehicles (EVs), and the overall load forecasting methodology spanning from retail to wholesale to system level. Duke also described emerging trends in its system that could shift it from summer peaking to winter peaking. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including how COVID-19 is affecting load forecasts, what potential benefits would result by forecasting system needs based on a single balancing authority for the Carolinas, and how Duke considers potential overlap in customers who are on NEM and also adopt EVs.

### 2.5.2. Overview of Stakeholder Survey Results

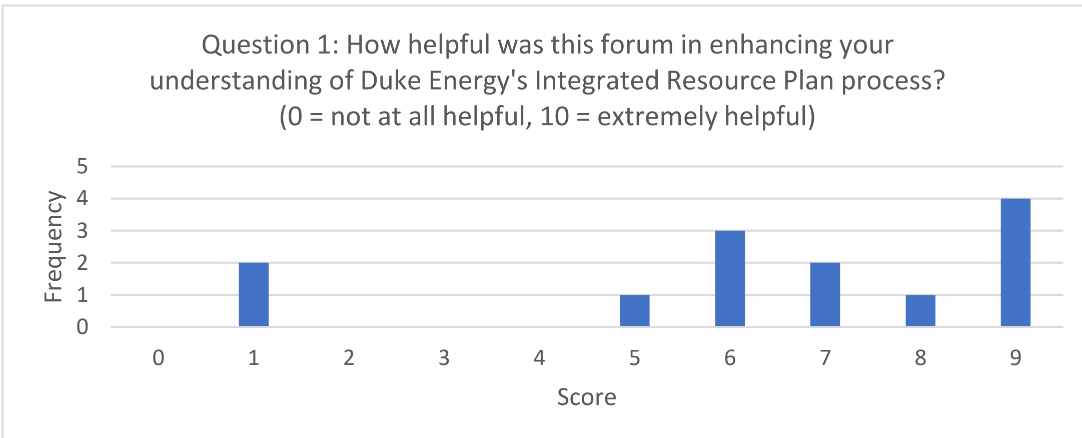
Duke developed a survey to capture stakeholder feedback about the value of the forum and opportunities to improve future engagement activities. The survey included five rating scale questions and four short-answer questions. The survey was available to stakeholders through the webinar platform immediately following the forum and Duke sent a follow-up email on March 19 to stakeholders with a reminder to complete the survey. In total, 18% of attendees participated in the survey.

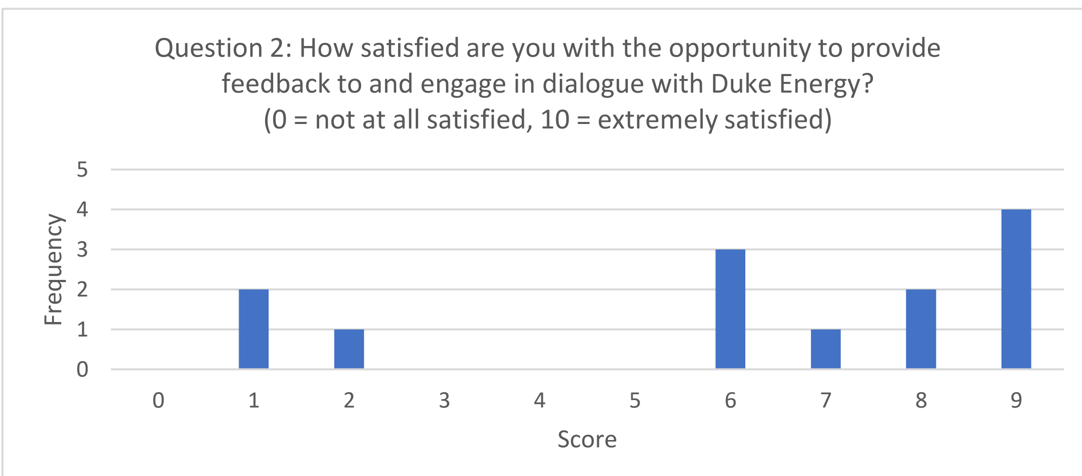
Figure 1 provides the distribution of all survey responses for each of the five rating-scale (i.e. on a scale of 0 to 10) questions. Average scores are as follows:

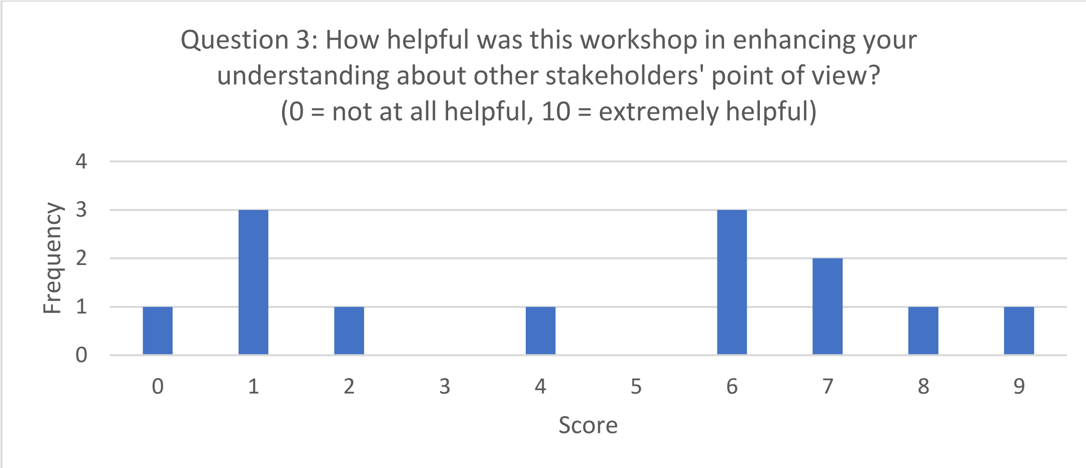
- Question 1: How helpful was this forum in enhancing your understanding of Duke Energy's Integrated Resource Plan process? (0 = not at all helpful, 10 = extremely helpful)
  - **Average score: 7.5**
- Question 2: How satisfied are you with the opportunity to provide feedback to and engage in dialogue with Duke Energy? (0 = not at all satisfied, 10 = extremely satisfied)
  - **Average score: 7.3**
- Question 3: How helpful was this workshop in enhancing your understanding about other stakeholders' point of view? (0 = not at all helpful, 10 = extremely helpful)
  - **Average score: 5.7**
- Question 4: How willing are you to engage in follow-up conversations with Duke Energy around the IRP initiative? (0 = not at all willing, 10 = extremely willing)

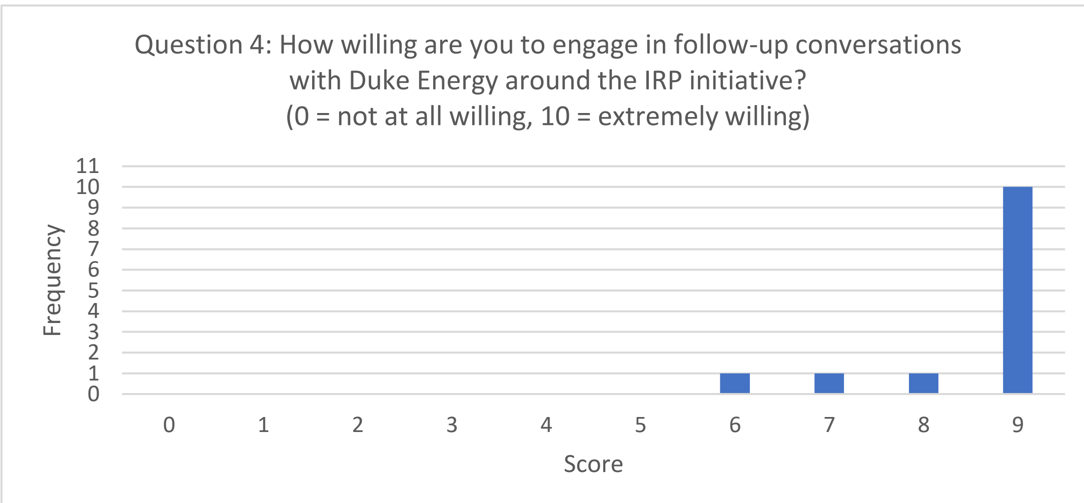
- **Average score: 9.5**
- Question 5: How effective was this workshop in providing a foundation for new kinds of conversation and collaboration going forward? (0 = not at all effective, 10 = extremely effective)
  - **Average score: 7.2**

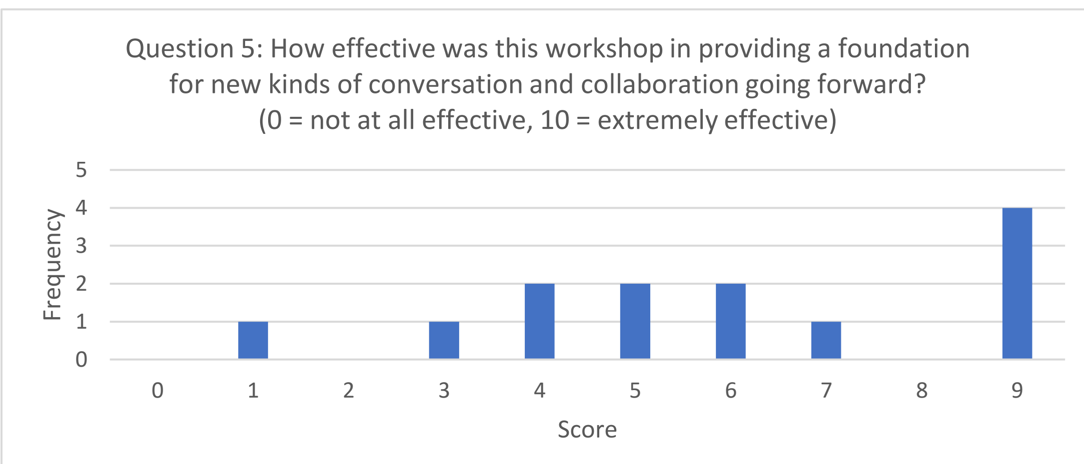
*Figure 1: Summary of Survey Responses to Rating-Scale Questions from 3/17 Forum*




Question 3: How helpful was this workshop in enhancing your understanding about other stakeholders' point of view?
(0 = not at all helpful, 10 = extremely helpful)
Frequency
0
1
2
3
4
0
1
2
3
4
5
6
7
8
9
Score


Question 4: How willing are you to engage in follow-up conversations with Duke Energy around the IRP initiative?
(0 = not at all willing, 10 = extremely willing)
Frequency
0
1
2
3
4
5
6
7
8
9
10
11
0
1
2
3
4
5
6
7
8
9
Score


Question 5: How effective was this workshop in providing a foundation for new kinds of conversation and collaboration going forward?
(0 = not at all effective, 10 = extremely effective)
Frequency
0
1
2
3
4
5
0
1
2
3
4
5
6
7
8
9
Score

In addition to the rating-scale questions, stakeholders provided written responses to four short-answer questions. Key themes of stakeholder responses for each question are summarized in Table 7.

*Table 7: Key Themes of Stakeholder Responses to Short-Answer Survey Questions from 3/17 Forum*

| Question | Key Themes |
|---|---|
| What specific topics from today's session would you like to see covered in greater depth at subsequent webinars or meetings? | • Pathways for greater integration of solar, storage, and non-wires alternatives<br>• Inputs used for the IRP analysis<br>• Incorporation of carbon reduction scenarios<br>• Effects on IRP due to changing winter and summer load curves |
| What did you like best about today's workshop? | • It was an effective format to begin each breakout session with a short overview of the topic followed by stakeholder Q&A<br>• The PowerPoint presentations were informative, and the Duke panelists were knowledgeable and responsive<br>• The webinar format allowed for high levels of stakeholder interaction in terms of submitting questions<br>• The moderator was helpful for keeping the conversation flowing |
| Do you have suggestions for improving the next workshop or other ideas for the stakeholder engagement process? | • More time for the Q&A sessions<br>• Focus more on providing details about the generation mix and data inputs rather than explaining what an IRP is and how the individual components work<br>• Explain more effectively how stakeholder input will inform the 2020 IRP since Duke has already determined its initial assumptions<br>• Use a better backdrop for Duke speakers using webcams<br>• Allow for a longer break around lunch time |
| Is there anything else you'd like to tell us that we haven't asked about? | • IRP modeling<br>  ○ How Duke will address IRP scenarios proposed by stakeholders or report on them to the North Carolina Utilities Commission and South Carolina Public Service Commission<br>  ○ Potential for Duke to (1) plan for firm capacity between its utilities in the IRP modeling and (2) allow for options like real-time or critical-period pricing<br>• Logistics<br>  ○ How Duke will respond to questions it did not have time to answer<br>  ○ Allow participants the option to use the computer for audio |

Following the forum, Duke followed up directly with individual stakeholders who asked questions during the forum but whose questions were unable to be addressed within the allotted timeframe. Prior to Duke's second IRP Forum, Duke created an IRP stakeholder web page at https://www.duke-energy.com/our-company/irp and posted materials from the IRP 101 webinar, March 17 forum and the agenda and slides for its April 16 forum.

## 2.6. Second IRP Forum

Duke hosted its second IRP forum on April 16, 2020 via webinar. Although initially scheduled as an in-person session in Raleigh, North Carolina, Duke converted the session to be entirely virtual due to the COVID-19 pandemic. ICF facilitated the stakeholder workshop on Duke's behalf. Duke posted the agenda and slides from the session, but did not record the workshop in order to avoid attribution of stakeholder comments and questions given the significant level of verbal dialogue between stakeholders and Duke presenters throughout the webinar.

Excluding Duke and ICF staff, the stakeholder workshop featured a total of 113 attendees (81 of which did not attend the South Carolina forum) representing 70 entities (Table 8). In addition to these external stakeholders, Duke subject matter experts and other leaders also engaged in the workshop.

*Table 8: Breakdown of Stakeholder Attendees from 3/17 Forum*

| Stakeholder Category | Total Attendees |
|---|---|
| **Academic/Research** | 17 |
| **Environmental** | 27 |
| **Government** | 38 |
| **Customers** | 7 |
| **Renewable/DER** | 8 |
| **Other** | 16 |

### 2.6.1. Overview of Forum Agenda and Breakout Sessions

Similar to the first forum, this forum began with an overview from ICF of the national landscape for utility IRP processes, including forecasting and planning requirements and recent national trends. Duke then provided an overview of the IRP process in the Carolinas and how that aligns with national best practices and trends.

Following the introductory presentations, ICF provided an overview of the first forum and explained how today's forum fit within the context of Duke's broader stakeholder engagement efforts for the 2020 IRP. Duke then provided an overview of how it designed the forum directly in response to feedback it had received from stakeholders across all the previous engagement efforts. First, Duke specifically designed this forum to be responsive to stakeholder desires to increase opportunities for dialogue, minimize the upfront level-setting presentations, and avoid having the webinar run through lunch. Second, Duke focused the three breakout sessions around three key areas of stakeholder interest: (1) data inputs; (2) generation trajectories; and (3) customer programs and pricing. Finally, Duke provided clear asks of stakeholder to provide the types of input that would be most valuable to Duke as it advanced its 2020 IRP.

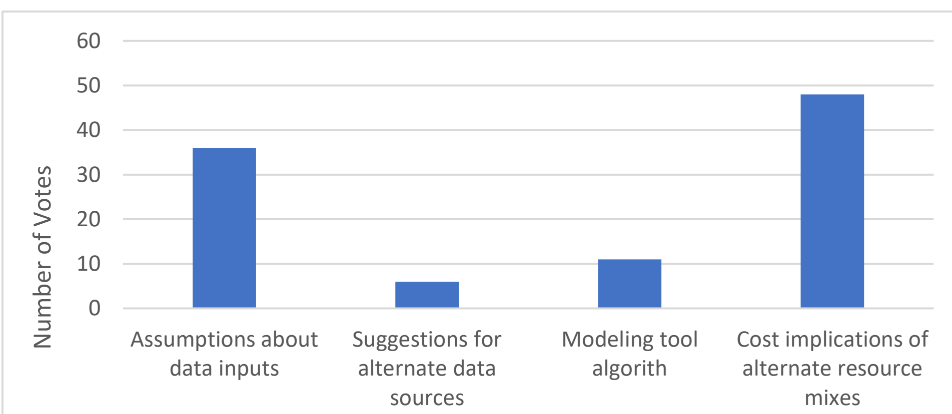
Similar to the first forum, Duke provided breakout sessions to enable an opportunity for further discussion on topics of greatest interest to stakeholders. The three breakout session topics – resource evaluation, carbon reduction in the IRP, and energy efficiency and demand response – were also in the first forum, but Duke adjusted presentation materials to more specifically focus on the three areas mentioned in the prior paragraph based on feedback from stakeholders. Additionally, Duke removed the fourth breakout session from the first forum (load forecasting) in order to allow greater time in each of the three breakout sessions for stakeholder dialogue.

Each session featured a short introduction from Duke subject-matter experts and concluded with ICF moderating a Q&A session between participants and Duke. To help shape the Q&A session, stakeholders were asked to vote through the webinar for which topics they wanted to discuss further out of a set of topics Duke had listed based on previously identified stakeholder priority topics. Given the magnitude of participation in the forum, attendees were instructed to "raise their hand" through the webinar so ICF could prompt stakeholders to ask questions in the order in which they raised their hand. Since there was not enough time to address all stakeholder questions, Duke committed to follow up individually with those stakeholders who had an outstanding question.

**Resource Evaluation**

Duke provided a short overview of the key considerations it takes when determining cost-effective resource mixes, which sources it uses for various data inputs, and key factors impacting evaluation for the 2020 IRP. In response to stakeholder feedback after the first forum, Duke expanded the list of data inputs and sources it shared with stakeholders and explicitly asked stakeholders to provide suggestions on any additional data sources. Additionally, to be responsive to stakeholder requests for further opportunities to engage during the forum, Duke had participants vote on their top two choices for discussion topics based on a set of four choices. Given the vote totals, the open dialogue portion of this breakout session focused on further exploring cost implications of alternate resource mixes and data input assumptions (Figure 2).

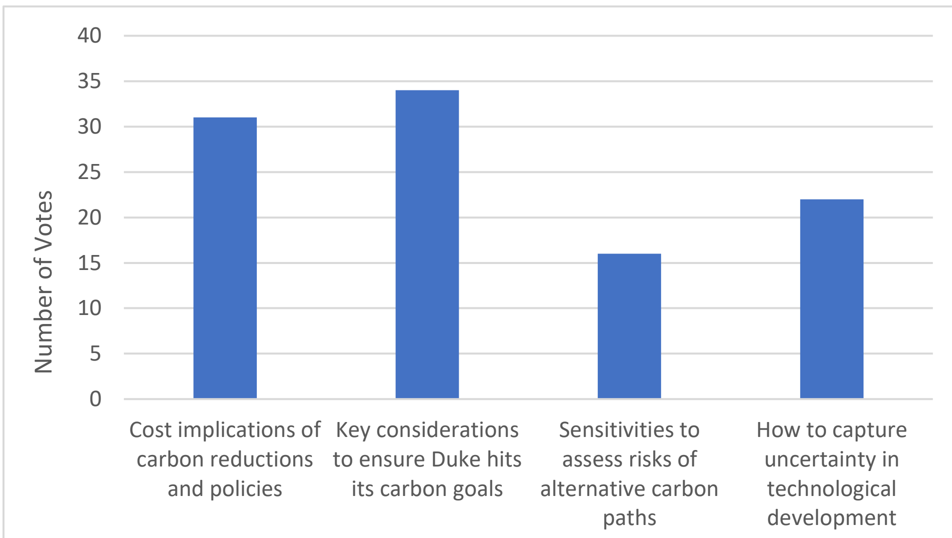
*Figure 2: Priority Resource Evaluation Topics for Attendees*



**Carbon Reduction in the IRP**

Duke provided a short overview of how the IRP will consider Duke Energy's climate strategy and the North Carolina Department of Environmental Quality (DEQ) Clean Energy Plan, including how this builds off Duke's current process for evaluating carbon reductions and what types of technological development will help achieve net-zero carbon emissions by 2050. Like the Resource Evaluation breakout session, attendees voted for their top two priority topics for further discussion with Duke. Based on the votes, Duke and stakeholders engaged in discussions around key considerations to ensure Duke hits its carbon goals and the cost implications of carbon reduction pathways and policies (Figure 3).

*Figure 3: Priority Carbon Reduction in the IRP Topics for Attendees*




**Energy Efficiency and Demand Response**

Duke began the breakout by explaining its EE forecast methodology, 2020 Market Potential Study, and the emerging trend that may shift the Carolinas to a winter peaking system from a summer peaking system. Given this potential for a winter peaking system and having heard stakeholder interest in exploring the potential role of DSM to help address this need, Duke unveiled the scope of a potential winter peaking study it could conduct to further evaluate how new rate designs and innovative program designs could drive winter peak load reductions. Unlike the other two breakout sessions, this one did not include a poll given Duke's interest in soliciting feedback specifically on the winter peaking study. During the ICF-moderated dialogue, stakeholders communicated wide support for undertaking the study and expressed interest in maintaining involvement as Duke further develops the study's scope.

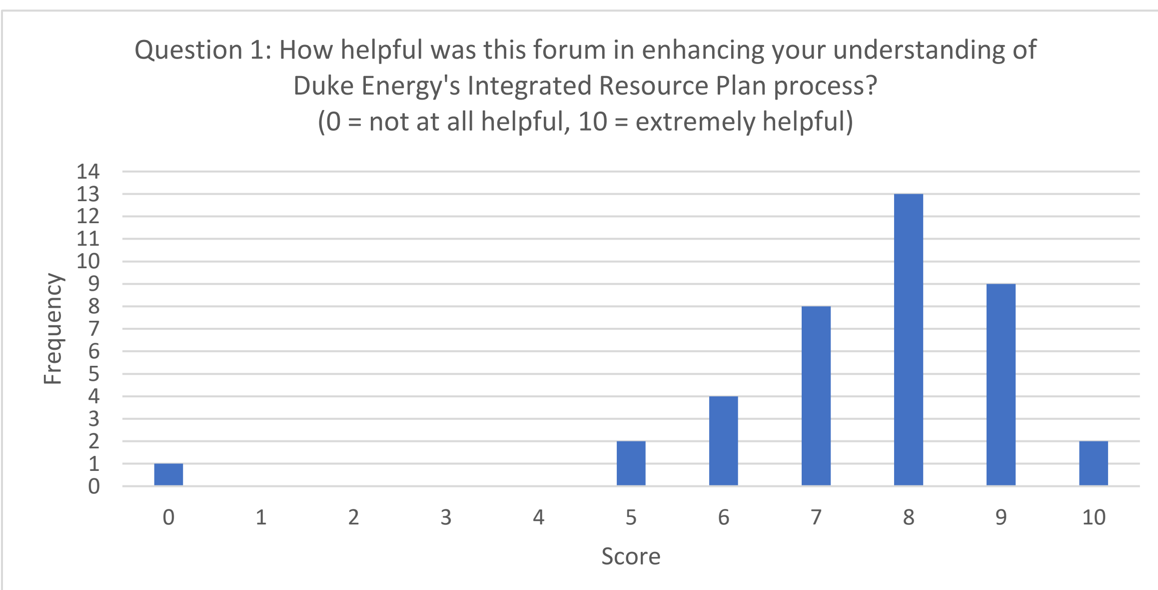
### 2.6.2. Overview of Stakeholder Survey Results

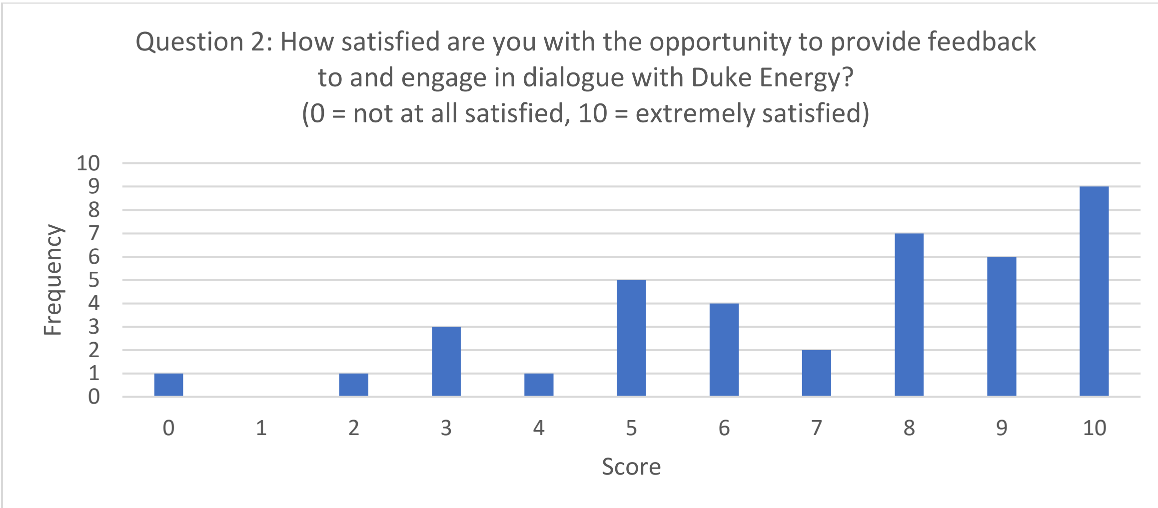
Duke developed a survey to capture stakeholder feedback about the value of the forum and opportunities to further improve future engagement activities. The survey included five rating scale questions and three short-answer questions. The survey was available to stakeholders through the webinar platform immediately following the forum and Duke sent a follow-up email on March 18 to stakeholders with a reminder to complete the survey. In total, 35% of attendees participated in the survey, nearly twice the participation rate of the survey from the first forum.

Figure 4 provides the distribution of all survey responses for each of the five rating-scale (i.e. on a scale of 0 to 10) questions. Average scores are as follows:

- Question 1: How helpful was this forum in enhancing your understanding of Duke Energy's Integrated Resource Plan process? (0 = not at all helpful, 10 = extremely helpful)
    - **Average score: 7.6**
- Question 2: How satisfied are you with the opportunity to provide feedback to and engage in dialogue with Duke Energy? (0 = not at all satisfied, 10 = extremely satisfied)
    - **Average score: 7.1**
- Question 3: How helpful was this workshop in enhancing your understanding about other stakeholders' point of view? (0 = not at all helpful, 10 = extremely helpful)
    - **Average score: 6.7**
- Question 4: How likely are you to provide Duke Energy with additional feedback before the May 1st deadline? (0 = not likely at all, 10 = extremely likely)
    - **Average score: 7.2**
- Question 5: How effective was this workshop in providing a foundation for new kinds of conversation and collaboration going forward? (0 = not at all effective, 10 = extremely effective)
    - **Average score: 6.8**

*Figure 4: Summary of Survey Responses to Rating-Scale Questions from 4/16 Forum*




Question 2: How satisfied are you with the opportunity to provide feedback to and engage in dialogue with Duke Energy?
(0 = not at all satisfied, 10 = extremely satisfied)
Frequency
10
9
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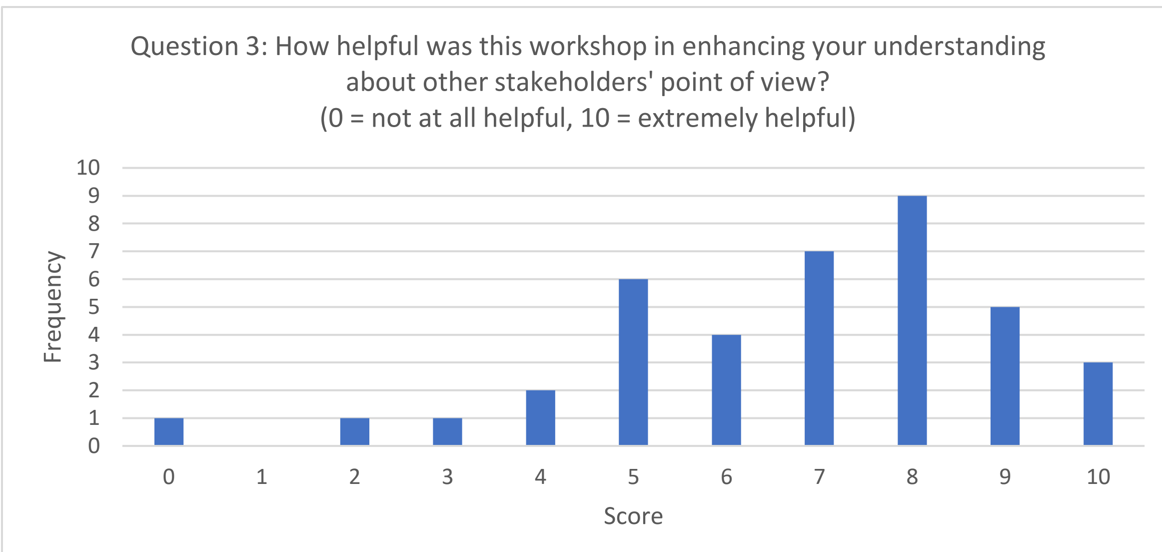
Question 3: How helpful was this workshop in enhancing your understanding about other stakeholders' point of view?
(0 = not at all helpful, 10 = extremely helpful)
Frequency
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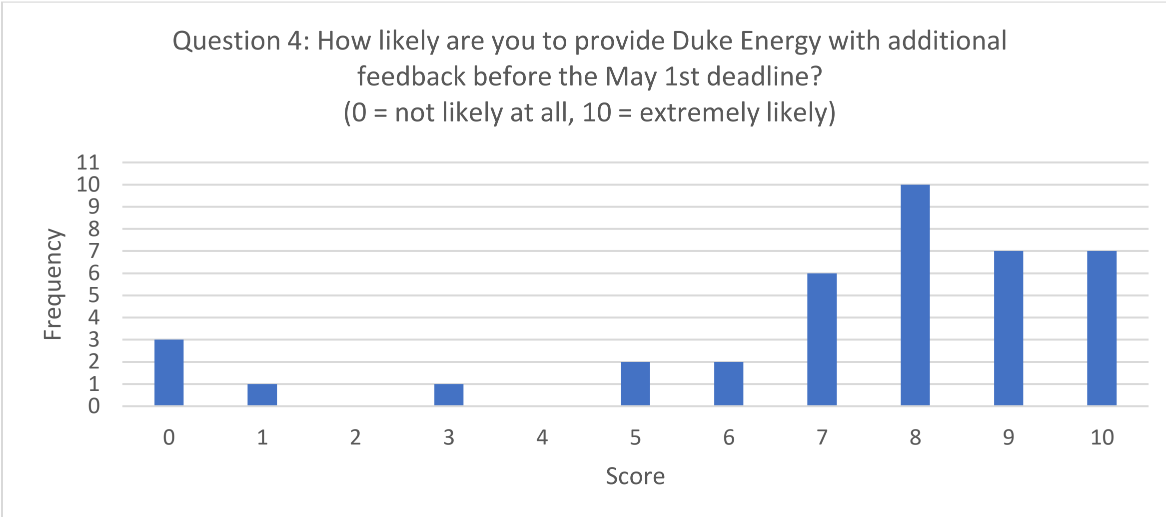
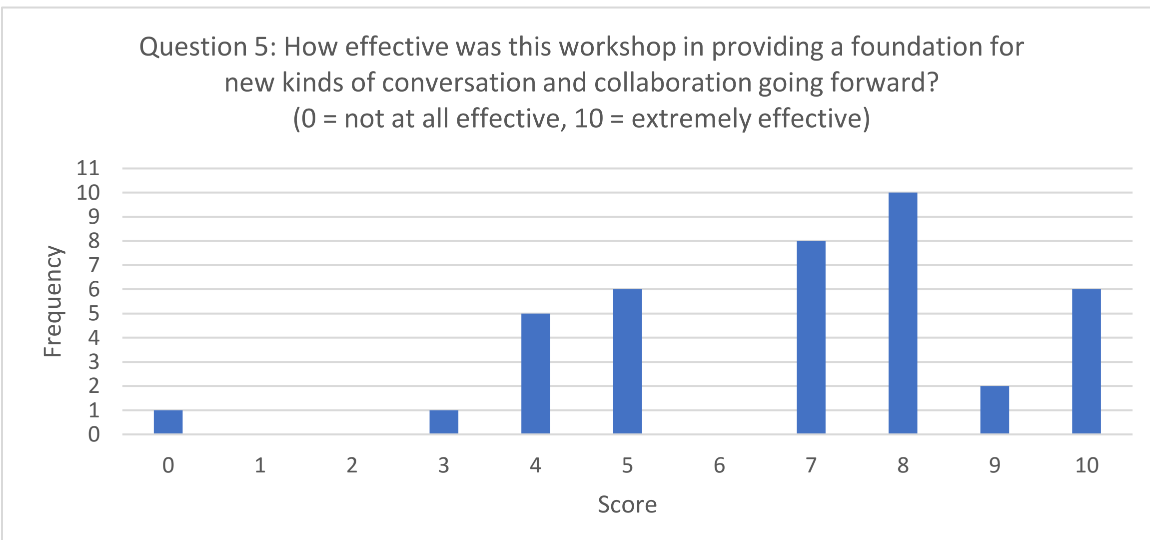



In addition to the rating-scale questions, stakeholders provided written responses to three short-answer questions. Key themes of stakeholder responses for each question are summarized in Table 9.

*Table 9: Key Themes of Stakeholder Responses to Short-Answer Survey Questions from 4/16 Forum*

| Question | Key Themes |
|---|---|
| Do you have suggestions for the early June stakeholder update? | • Continue to share sought after information, as available, with stakeholders to ensure a productive conversation<br>• Share slides further in advance to allow stakeholders to more sufficiently digest discussion topics<br>• Allow additional time to enable more of a two-way dialogue with stakeholders |

| Question | Key Themes |
|---|---|
| | • Explore creation of a sub-committee to further evaluate the potential scope of a winter peaking study, and allow for an update on progress during the June update |
| What did you like best about today's forum? | • Ample opportunities to ask questions and vote on priority topics<br>• Speakers were knowledgeable and clear<br>• Appreciation for Duke's clear request of what kinds of additional input it would deem valuable |
| Is there anything else you'd like to tell us that we haven't asked about? | • Further consideration needed about the time difference between the IRP (15 years) and Duke Energy's carbon reduction goals (50% reduction by 2030; net-zero by 2050)<br>• Stakeholders appreciated making this a webinar format given the COVID-19 crisis<br>• Appreciation for using an independent facilitator for the engagement process |

Following the forum, Duke followed up directly with individual stakeholders who asked questions during the forum but whose questions were unable to be addressed within the allotted timeframe.

## 2.7. Final Pre-IRP Filing Webinar

Duke hosted its final pre-IRP filing webinar on June 18, 2020, with ICF facilitating the stakeholder webinar on Duke's behalf. Duke shared the slides from the session. To encourage open dialogue, Duke did not record the webinar or attribute questions asked during the webinar to specific attendees. Excluding Duke and ICF staff, the stakeholder workshop featured a total of 97 attendees representing 61 entities (Table 10).

*Table 10: Breakdown of Stakeholder Attendees from Final Pre-IRP Filing Webinar*

| Stakeholder Category | Total Attendees |
|---|---|
| **Academic/Research** | 8 |
| **Environmental** | 28 |
| **Government** | 26 |
| **Customers** | 4 |
| **Renewable/DER** | 15 |
| **Other** | 16 |

### 2.7.1. Overview of Webinar Agenda and Breakout Sessions

Duke and ICF structured the webinar to provide stakeholders with clear guidance on how Duke was responding to stakeholder feedback it had received over the course of its formal engagement process. ICF began the webinar with an overview of the 2020 IRP stakeholder engagement timeline and a high-level description of the key themes of stakeholder feedback that had generated the most interest and/or support. Duke then provided an overview of how the 2020 IRP will differ from prior IRPs, which in large part was driven by the feedback Duke received throughout this process from stakeholders.

The stakeholder webinar then centered on three breakout sessions focused on the three areas of greatest interest/support among stakeholders: (1) resource evaluation, data access and inputs; (2) carbon reduction; and (3) EE, DR, and winter peaking. Like the two prior forums, ICF facilitated Q&A sessions to close each of the breakout sessions.

**Resource Evaluation, Data Access and Inputs**

Duke provided an overview of the key areas of stakeholder feedback—such as requests for expanded data sources and availability and suggestions for how to structure Duke's modeling—and what actions it would take in response. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including how the IRP will account for COVID-related impacts, assumptions made around solar plus storage growth and costs, if the IRP would include sensitivities around whether the Atlantic Coast Pipeline would be completed, and the role of competitive solicitations in determining the future resource mix.

**Carbon Reduction**

Building off of the first breakout session, Duke provided further information about how the IRP would address stakeholder feedback in terms of its incorporation of the Clean Energy Plan and Duke corporate climate goals, relationship to the coal retirement analysis, and assumptions around new technologies including solar, storage, solar plus storage, and wind. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including the carbon price Duke uses for the IRP, the role of zero-emitting load-following resources (ZELFRs) in achieving carbon reductions, the methodology for calculating rate impacts of alternative pathways, and how the IRP would consider scenarios that achieve $CO_2$ emissions reductions beyond 50% by 2030.

**EE, DR and Winter Peaking**

Duke began by providing updates on its EE market potential study and how that would factor into the 2020 IRP. Additionally, Duke provided further details around its plans for conducting a winter peak reduction study given the significant stakeholder support for conducting the study. During the ICF-moderated Q&A session, Duke answered stakeholder questions focusing on topics including how transportation electrification factors into the study to reduce winter peak loads, what the historical contribution of hot water heaters has been to winter peaks, and what the role of advanced metering infrastructure (AMI) would be for leveraging the capabilities of smart thermostats.

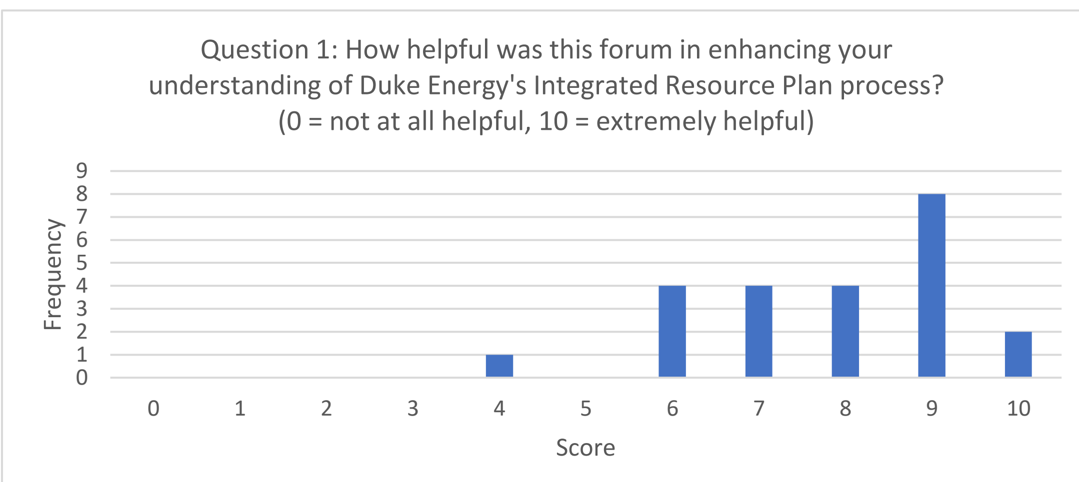
### 2.7.2. Overview of Stakeholder Survey Results

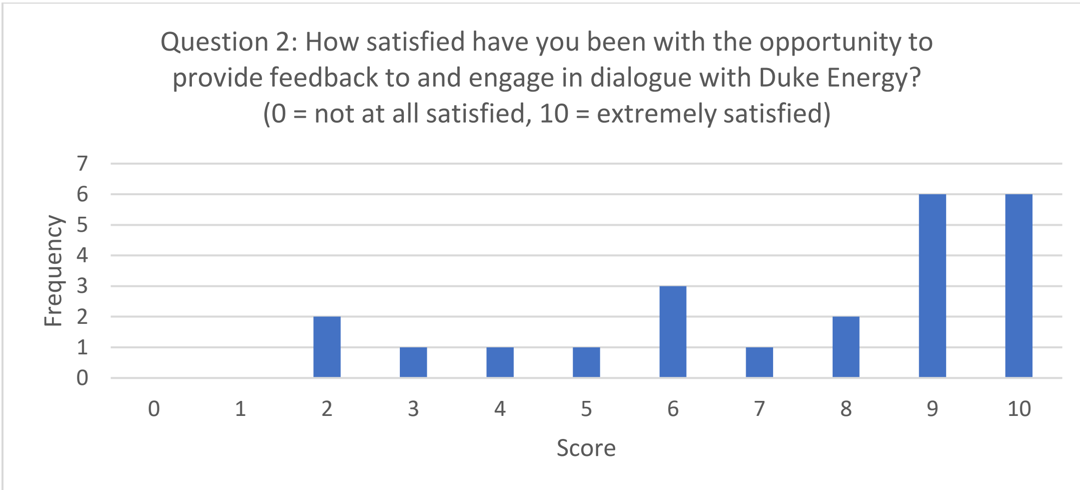
Duke developed a survey to capture stakeholder feedback about the value of the webinar and the overall stakeholder process. The survey included five rating-scale questions and two short-answer questions. The survey was available to stakeholders through the webinar platform immediately following the webinar and Duke sent a follow-up email to stakeholders with a reminder to complete the survey. In total, 24% of attendees participated in the survey.

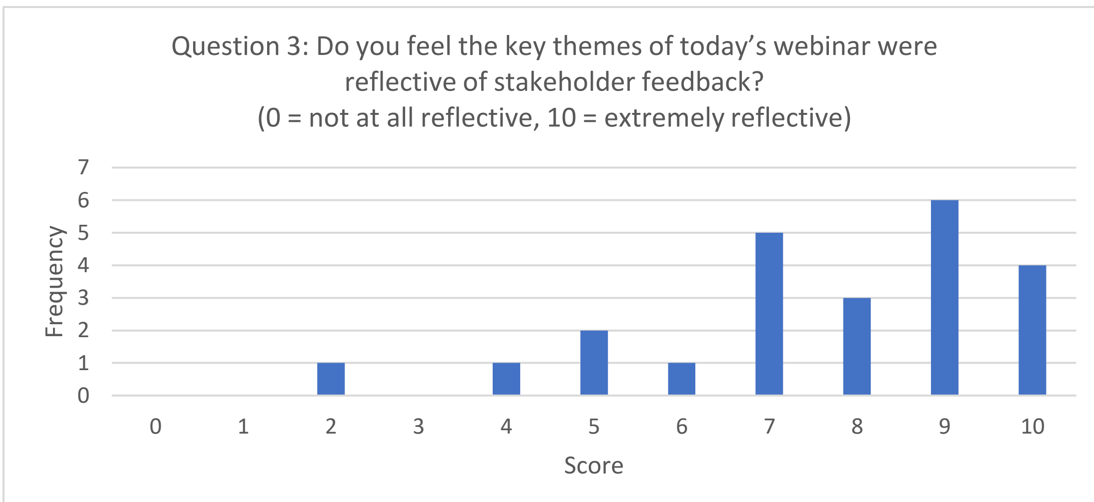
Figure 5 provides the distribution of all survey responses for each of the five rating-scale (i.e. on a scale of 0 to 10) questions. Average scores are as follows:

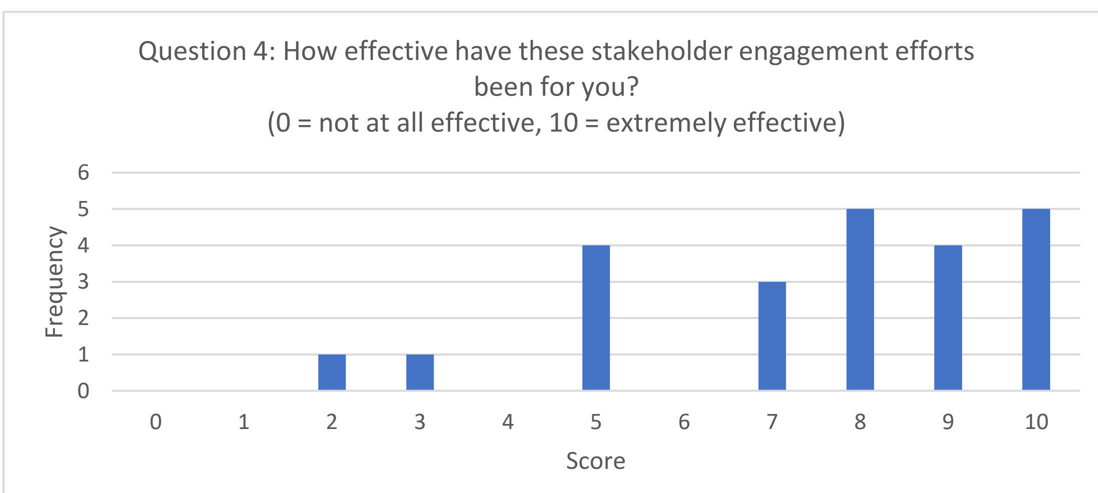
- Question 1: How helpful was this forum in enhancing your understanding of Duke Energy's Integrated Resource Plan process? (0 = not at all helpful, 10 = extremely helpful)
    - **Average score: 7.8**
- Question 2: How satisfied have you been with the opportunity to provide feedback to and engage in dialogue with Duke Energy? (0 = not at all satisfied, 10 = extremely satisfied)
    - **Average score: 7.4**
- Question 3: Do you feel the key themes of today's webinar were reflective of stakeholder feedback? (0 = not at all reflective, 10 = extremely reflective)
    - **Average score: 7.6**
- Question 4: **How effective have these stakeholder engagement efforts been for you?** (0 = not at all effective, 10 = extremely effective)
    - **Average score: 7.5**
- Question 5: **How likely would you be to engage in future IRP discussions?** (0 = not likely at all, 10 = extremely likely)
    - **Average score: 9.0**

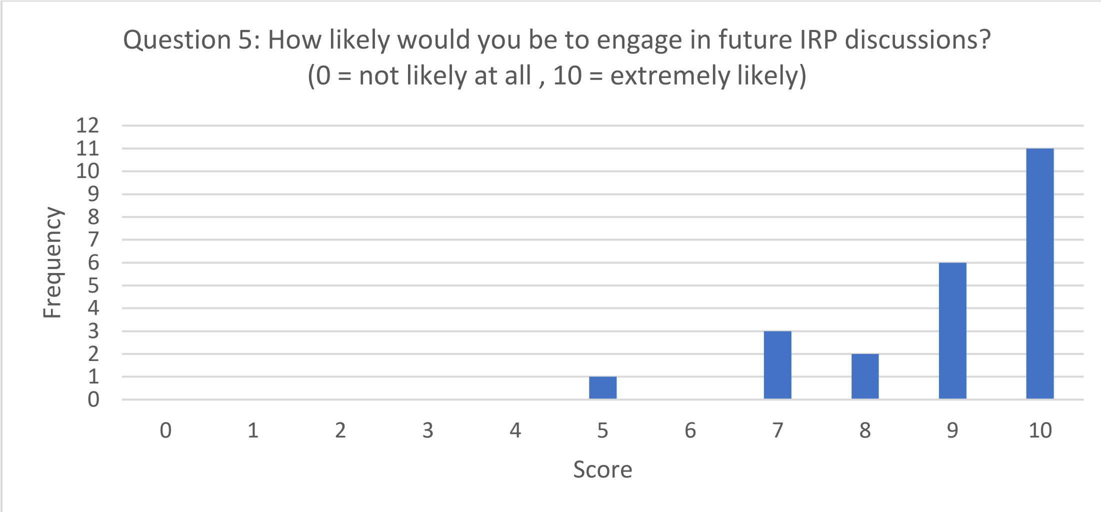
*Figure 5: Summary of Survey Responses to Rating-Scale Questions from 6/18 Webinar*




Question 2: How satisfied have you been with the opportunity to provide feedback to and engage in dialogue with Duke Energy?
(0 = not at all satisfied, 10 = extremely satisfied)
Frequency
Score
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7 8 9 10


Question 3: Do you feel the key themes of today's webinar were reflective of stakeholder feedback?
(0 = not at all reflective, 10 = extremely reflective)
Frequency
Score
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7 8 9 10


Question 4: How effective have these stakeholder engagement efforts been for you?
(0 = not at all effective, 10 = extremely effective)
Frequency
Score
0 1 2 3 4 5 6
0 1 2 3 4 5 6 7 8 9 10




In addition to the rating-scale questions, stakeholders provided written responses to two short-answer questions. Key themes of stakeholder responses for each question are summarized in Table 11.

*Table 11: Key Themes of Stakeholder Responses to Short-Answer Survey Questions from 6/18 Webinar*

| Question | Key Themes |
|---|---|
| What did you like best about today's workshop? | • The Duke subject matter experts were able to provide targeted and informed updates on stakeholder feedback<br>• Duke's transparency around what stakeholder feedback will be incorporated into the 2020 IRP<br>• Significant time allocated to allow Duke to answer stakeholder questions submitted during the webinar |
| Is there anything else you'd like to tell us that we haven't asked about? | • If possible, it would be preferred to allow stakeholders to verbally ask questions rather than submit them in typed form<br>• More time could have been spent on the breakout sessions rather than providing another round of background information<br>• Interest in having greater transparency into the assumptions underlying the various scenarios |

Following the forum, Duke followed up directly with individual stakeholders who asked questions during the forum but whose questions were unable to be addressed within the allotted timeframe.

## 3. Next Steps

Duke is incorporating the stakeholder input into the development of the 2020 IRPs for DEC and DEP and will work with intervenors to provide access to key inputs in an expedited fashion shortly after filing. Duke also plans to hold a post-filing Technical Briefing in September and share additional details on IRP inputs as well as key takeaways from the expanded analysis in the 2020 IRPs, which will reflect alternate resource portfolios as part of a broader range of scenarios and sensitivities compared to past IRPs.